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CRESCENT HILL FILTERS.

The Bradley & Gilbert Company, Louisville, Ky.

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WORKS

FOR

SUBSIDING, COAGULATING, FILTERING

AND

PURIFYING WATER

FOR THE

LOUISVILLE WATER COMPANY

AT

CRESCENT HILL.

LOUISVILLE:
THE BRADLEY & GILBERT COMPANY, PRINTERS.
1900.

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N. B.—A caveat has been filed in the U. S. Patent Office upon all designs, members, devices, combinations, arrangements, and mechanism, with their functions pertaining to the art of water filtration and purification, as hereinafter described.

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Louisville, Ky., December 13, 1900.

ADVERTISEMENT.

FOR LOUISVILLE FILTERS.

SEALED PROPOSALS, addressed to the Louisville Water Company, for the construction of a system of American (mechanical) filters, will be received at said company's office until 12 o'clock noon, January 26, 1901, upon plans and specifications submitted by this company.

The work is subdivided into twenty-four different parts, any one or all of which may be bid for by the same party or firm of contractors, as follows:

Proposal I—For pipes, specials, and gate-valves, outside of and under the filter-house.

" II— " ways in filter-house to support an electric crane.

" III— " three filter-tanks.

" IV— " 20-inch, 30-inch, and 36-inch pipes and specials connected with three filter tanks.

Proposal V—For gate-valves.

" VI— " six balanced 20-inch piston valves.

" VII— " six floating weirs.

" VIII— " sand layer support and strainer system for three filter-tanks.

" IX— " electric traveling-crane.

" X— " agitator.

" XI— " electric motors.

" XII— " gauges and tablets.

" XIII— " filter sand.

" XIV— " one stand-pipe and four sulphate of alumina solution-tanks.

" XV— " meter motor.

" XVI— " pumps and slotted disc-crank.

" XVII— " floating discharge-tube in stand-pipe.

" XVIII— " sulphate of alumina feed-tank.

" XIX— " pipes, specials, and fittings in coagulant-house.

" XX— " galleries, platforms, floors, and stairs.

" XXI— " elevator in coagulant-house.

" XXII— " two chronometers.

Proposal XXIII—For lighting coagulant and filter-houses.

" XXIV— " heating systems in coagulant and filter-houses.

Plans and specifications for the above can be obtained on and after December 13th, 1900, at the office of the Louisville Water Company.

Plans, specifications, and proposals, for filters of the same maximum capacity and requirements for water purification as above set forth, made and submitted from designs for American (mechanical) filters, other than those referred to by this advertisement, will also be received. Such plans, specifications, and proposals, in order to be considered, must state the terms of payment by the Water Company, and be accompanied by such guarantees to said company as to capacity, efficiency, and cost of operation as may be satsfactory.

If contracts are made based upon the Water Company's plans and specifications, partial payments will be made in cash at the Water Company's office, from month to month, as the work progresses, as follows: Upon acceptable material delivered at the

water purification site, fifty (50) per cent. upon their estimated contract value; when erected and ready for trial, thirty (30) per cent. more; and when completed, tried, and accepted, the remaining twenty (20) per cent.

A cash certificate, or certified check, equal to ten (10) per cent. of the amount bid, must accompany each proposal, as a guarantee that, if the contract is awarded under such proposal, the maker thereof will enter into a contract therefor within ten days of the making of the award.

Bond, with approved security and acceptable to the Louisville Water Company, to the amount of fifty (50) per cent. of the money value of the contract, will be required of each contractor.

The Louisville Water Company reserves the right to reject any or all proposals submitted.

LOUISVILLE WATER COMPANY,

By CHAS. R. LONG,

President.

WATER PURIFICATION WORKS

OF THE

LOUISVILLE WATER COMPANY.

DIVISION A.

INTRODUCTION.

1. SUBDIVISIONS OR PRINCIPAL SECTIONS OF THE PURIFICATION WORKS.—The principal sections of the contemplated water purification works will be four in number, which are below described in the physical order of their construction.

2. (A) Plain subsidence in Crescent Hill Reservoir, of two basins each of 50,000,000 gallons capacity, which reservoir was constructed in 1877, 1878, and 1879, which has hitherto been used as a subsiding, storage, and distributing reservoir, in which capacity it will continue, but will hereafter deliver the settled water to the

coagulating chambers and devices, and thence to the filters, instead of the city, as it has hitherto served.

3. (B) The clear water reservoir, of 25,000,000 gallons capacity, for storing filtered water, and the filter-house, both of which are now under contract and in process of construction.

4. (C) Purification (through the processes of subsidence, coagulation, and filtration) will consist of removing from the water:

1st, Turbidity;

2d, Color;

3d, Organic matter;

4th, Bacteria;

and is to be accomplished by the structures, vessels, devices, machines, and appliances described in the following ninety-six paragraphs of these specifications.

5. A connection outside of the filter-house, between the 36-inch and 48-inch lines of supply pipes from Crescent Hill Reservoir to the city, requiring one 36-inch by 36-inch by 36-inch Y pipe, one 48-inch by 48-inch by 36-inch Y pipe,

one 36-inch curve, two 36-inch gate-valves, one 36-inch sleeve, and one 48-inch sleeve.

6. One 48-inch gate-valve, located opposite the southwestwardly corner of the filter-house in the line of 48-inch main supply pipe from Crescent Hill Reservoir to the city, which 48-inch gate-valve, with the two 36-inch gate-valves above named, will enable the two lines of 36-inch and 48-inch city supply mains to be used jointly or severally and thereby made to supply raw or unfiltered water eastwardly of said 36-inch and 48-inch gate-valves, and filtered or clear water westwardly therefrom, when filter works shall have been completed. By this arrangement, should an accident happen to the filter works or pumping machinery, threatening the filtered water supply to the city with interruption, the whole purification plant can be cut out and the city of Louisville supplied with water directly from Crescent Hill Reservoir, the same as is done at the present day.

7. One plate-steel stand-pipe or coagulating tank, erected near the northeastwardly corner of the filter-house, 50 feet in diameter and 75 feet high above its foundation, the supply of water to which is to be from the line of 48-inch pipe from Crescent Hill Reservoir to the city (after its connection with the line of 36-inch pipe) as a raw water supply main to said stand-pipe through one or more meters, in which stand-pipe or tank the water is to be coagulated, and from which it is to be drawn by the continuation of the same line of 48-inch coagulated raw water supply main and through four 36-inch branches therefrom into the filter-house.

8. At the northeastwardly corner of the clear water reservoir, opposite the entrance to Crescent Hill Reservoir, is to be erected a brick or concrete building, fronting 60 feet on the Shelbyville Turnpike and extending back southwardly parallel with and contiguous to the filter-house 120 feet or less, which house is to be used for storing the chemicals, is to contain the stand-

pipe or tank, the coagulating preparation supply and regulation devices, as also the laboratory connected with the works.

9. Four lines of 36-inch coagulated raw water supply-pipes, leading from the before mentioned line of 48-inch coagulated raw water supply-pipe to the filter-house, through the walls thereof, and terminating at 36-inch gate-valves above the floor at the ends of the two groups of filters hereafter to be described. These pipes, between the line of 48-inch pipe and the 36-inch gate-valves at their ends in the filter-house, shall consist of the following parts, respectively:

10.

No. 1.		Lbs.
1	48-inch x 48-inch x 36-inch tee, . .	9,000
2	48 " sleeves, ...	3,000
1	36 " pipe, 8 feet long, . . .	3,200
1	36 " " 12 "	4,700
1	36 " curve, 4 "	1,700
3	36 " pipes, 12 " each, . .	14,100
1	36 " 90 deg. curve, 2.33 ft. long,	2,700
1	36 " pipe, 9.9 feet long, . . .	4,100
1	36 " gate, 1.92 " . . .	11,000
		53,500

11. No. 2.

		Lbs.
1	48-inch x 48-inch x 36-inch tee, . .	9,000
2	48 " sleeves, ...	3,000
1	36 " pipe, 17.42 feet long, . .	7,000
1	36 " 90 deg. curve, 4.96 ft. long,	3,480
1	36 " pipe, 9.90 feet long, . .	4,100
1	36 " gate, 1.92 " . . .	10,000
		36,580

12. No. 3.

		Lbs.
1	48-inch x 48-inch x 36-inch tee, . .	9,000
2	48 " sleeves, ...	3,000
1	36 " pipe, 17.42 feet long, . .	7,000
1	36 " 90 deg. curve, 4.96 ft. long,	3,480
1	36 " pipe, 9.90 feet long, . .	4,100
1	36 " gate, 1.92 " . . .	10,000
		36,580

13. No. 4.

		Lbs.
1	48-inch x 48-inch x 36-inch tee, . .	9,000
2	48 " sleeves, ...	3,000
1	36 " pipe, 16 feet 6 inches long,	6,600
1	36 " 90 deg. curve, 13.17 ft. long,	5,500
1	36 " pipe, 10.19 feet long, . .	4,200
1	36 " gate, 1.92 " . .	10,000
		38,300

14. No. 5. Lbs.

1	20-inch pipe, 9 feet 6 inches long,	1,663
3	20 " pipes, 12 feet long, . . .	6,300
4	20 " curved pipes, 4 ft. 6 inches long, ...	3,150
4	20-inch Y pipes, 3 ft. 6 inches long,	3,500
		14,613

15. No. 6. Lbs.

1	48-inch x 48-inch x 30-inch special tee, 8 feet 8 inches long, . .	9,000
1	36-inch x 36-inch x 30-inch special tee, 8 feet long, ...	5,400
2	48-inch sleeves, ...	3,000
2	36 " "	1,200
1	30 " pipe, 9 feet 8 inches long,	3,300
1	30 " vertical curve, 4 feet long,	2,000
1	30 " pipe, 5 feet long, . . .	1,700
4	30 " x 30-inch x 20-inch tees, 2 ft. 9 inches long, ...	2,100
1	30-inch pipe, 7 feet 7½ inches long,	2,400
1	30 " " 7 " 9 " "	2,400
1	30 " " 5 " 7 " "	1,100
2	30 " quarter bends, ...	2,000
33	30 " pipe, 12 feet long, . .	132,000
2	30 " gates, ...	13,000
		180,600

16. Two groups of filter-tanks as hereinbefore described.

17. A system of raw water supply-pipes, clear water effluent-pipes, clear wash water supply-pipes, and wash water waste-pipes, with their branches, valves, regulating and controlling devices for the two groups of filter-tanks.

18. One sand-agitator, to be used for agitating the sand layers successively in any of the six filter-tanks comprised in the two groups.

19. A compound traveler or traveling crane for transferring the agitator transversely across the filter-house from tank to tank, and longitudinally thereof from group to group.

20 A system of electric motors for operating valves, agitators, travelers, etc.

21. (D) A new power station with pumping machinery for re-elevating the filtered water and distributing it throughout the system of water pipes in the city upon the direct pressure plan and for generating all other power needed, which power station is to be located westwardly of and adjacent to the clear water

reservoir named in paragraph B of this subdivision.

22. It is for constructing the third division (C), paragraphs 23 to 120, inclusive, that the following specifications are provided.

DIVISION C.

SPECIFICATIONS.

23. **System.**—Specifications for a system of American (Mechanical) Filters to be constructed and erected for the Louisville Water Company, in houses to be built for the purpose by said company at Crescent Hill, Jefferson County, Kentucky.

24. **Location.**—The filters are to be delivered and erected at the Louisville Water Company's Water Purification Station, situated at Crescent Hill, on the L. C. & L. branch of the L. & N. System of Railroads; also on the Shelbyville and Louisville Turnpike, adjacent and contiguous to Crescent Hill

Reservoir, and four and one-half miles distant from the court-house in Louisville. There is a standard track railroad switch running into the station from the main line of the railroad.

25. **Definition.**—By the American (Mechanical) System of Filters, is meant filters composed of layers of sand, placed in metal tanks, through which sand and tanks the turbid and unfiltered water will be passed, having first been settled in Crescent Hill Reservoir and then coagulated by the application of chemicals (presumably the sulphate of alumina), and by such coagulation and passage through sand layers, become clarified and purified; the system also includes the cleaning of the sand layers (in place, without removing them from the filter-tanks) by the use of currents of water, air, or the two combined, passed through the sand layers in a direction the reverse of that of filtration and purification. In its application at the Louisville Purification Works it combines therewith subsidence, which latter is not exclusively an American process. Thus amplified, it will comprise processes in the following physical order:

First—Plain subsidence in Crescent Hill Reservoir.

Second—The application of coagulants (chemicals) at some point between the reservoir and the filters.

Third—Rapid sand filtration by the force of gravity.

Fourth—Cleansing the sand by reverse currents of water, air, or the two combined, under necessary pressure, accompanied by mechanical agitation (if deemed necessary), and a restoration of the sand by each such cleansing to its normal condition of efficiency.

26. **Number of Units.**—The filter-house will contain six units, two groups, three in a group, one group at the southerly end of the house and the other at the northerly end. One group of three tanks only is now to be built.

27. **Size of Each Unit.**—Each filter or unit will consist of a rectangular tank, 146 feet 11⅜ inches long, 30 feet 3 inches wide, and 8 feet deep, in the clear.

28. **Capacity of Each Unit.**—Each filter or unit will have a sand surface area of one-tenth of an acre, so that, when filtering at the rate of 125,000,000 gallons in twenty-four hours per acre, each unit will give an output of 12,500,000 gallons per twenty-four hours; or 75,000,000 gallons per twenty-four hours for the six tanks, as the maximum volume filtered under the most favorable conditions. The floor area of the filter-house will be one acre; the area of the sand layers in the six filter-tanks will be six-tenths of an acre, leaving four-tenths of an acre of the floor space to be occupied by a system of pipes and other needful details.

FILTER TANKS.

29. The individual tanks for each group of filters are to be constructed of plate-steel, riveted, and built to the forms and dimensions given upon the drawings. Each tank is to be divided into a lower and upper compartment by means of a horizontal diaphragm, such diaphragm being constructed of transverse I-beams and brass wire-cloth laid there-

upon of such number of folds, gauge of wire, size of mesh, manner of piling and connecting, and strength of webs, as will safely support the sand layer, permit the filtered water to pass through the cloth, retain the sand and permit the reverse current for washing the sand layer to pass through it in the sand cleansing process, all under pressure and at rates of flow involved by the requirement stated in the preceding paragraph. In brief, the office of the diaphragm is to support the sand layer, and constitute, what is ordinarily termed in mechanical filters, the strainer system. The lower and upper compartments of each tank are to be, respectively, 36 and 60 inches in height.

30. In the lower compartment of each filter-tank are to be two lines of 20-inch pipe, each of which is to alternately withdraw the filtered water therefrom, or supply the wash water thereto, by the proper location and operation of the necessary gate-valves, all as illustrated upon the drawings and hereinafter described; they constitute, by reason of these functions, the effluent pipes for the filtered water, and influent pipes for the wash water.

31. Along the upper longitudinal margin of the tanks in each group are to be twelve (two double and two quadruple) plate-steel ducts for the inflow of the subsided and coagulated water to be filtered, and also for the outflow of the wash water used for cleansing the sand layer, all as illustrated upon the drawings.

32. The system of pipes for supplying the unfiltered water to the sand layer, the withdrawing from the lower compartments of the tanks of the filtered water, and the supplying to said lower compartments of the tanks the clear water for washing purposes, for each group of tanks, are to be as follows:

33. Of the four lines of 36-inch unfiltered water supply-pipes named in paragraphs 10, 11, 12, and 13 of the introduction of these specifications, No. 1 is to enter the filter-house from the easterly side 12.42 feet south from the north end; No. 2, on the same side, 186.71 feet south from the north end; No. 3, on the same side, 205.55 feet south from the north end; and No. 4, from the southerly end 37.39 feet westwardly from the easterly side thereof. Inside

of and transversely across the filter-house, 6 feet ¾ inch above the floor thereof, these four lines of inflow-pipes are to be of three sizes—36 inches in diameter opposite the end of the first tank, 30 inches opposite the end of the second tank, and 20 inches opposite the end of the third tank, counting from the easterly wall of the house.

34. To each one of the four 36-inch unfiltered water supply-pipes inside of the walls of the house, 1 foot 9½ inches above the floor, is to be attached a 36-inch gate-valve.

35. From the three named (36-inch, 30-inch, and 20-inch) sections of the four lines of unfiltered water supply-pipes (see paragraphs 10, 11, 12, and 13) there are to be twelve 20-inch branches, with gate-valves attached, leading from these pipes into opposite ends of the ducts along the upper margins of the filter-tanks, for the purpose of introducing the unfiltered water to the tanks for passage through the sand layers; that is, each tank is to have two 20-inch supply-pipes, one from each end. Just before connecting with the ducts there shall be placed in each of these unfiltered water supply-pipes a 20-

inch balanced piston regulating valve, as shown upon the drawings, for the purpose of maintaining a uniform depth of water on the sand layer in each filter-tank.

36. To the twelve 20-inch unfiltered water supply-pipes to the two groups of three filter-tanks are to be connected, between the tanks and the 36-inch, 30-inch, and 20-inch supply-pipes, twelve 20-inch T branch-pipes, leading down from between the said ducts at the upper margins of the filter-tanks and the unfiltered water supply-pipes, to the 20-inch branch drain-pipes extending through the walls of the filter-house, below the level of the main floor, to and connecting with the 20-inch stoneware drain-pipe, leading from Crescent Hill Reservoir to Beargrass Creek, for the purpose of wasting the wash water through said pipe into said Beargrass Creek, each of which drain connecting pipes is to be provided with a 20-inch gate-valve. The unfiltered water supply pipes, clear water effluent-pipes, wash water supply-pipes, wash water waste-pipes, with their several branches and gate-valves, are illustrated in their proper positions in the various plans, elevations,

and sections given on sheets 1, 1A, 9, and 10 of the drawings.

37. The filtered water effluent-pipes from the filter-tanks into the reservoir below the floor of the house, and the wash water supply-pipes for washing the filters, are to be arranged as follows:

38. The lines of 36-inch and 48-inch filtered water supply-pipes to the city are to be connected by a line of 30-inch pipe passing through the filter-house, underneath the floor thereof, three feet eastwardly from the westerly wall of said filter-house, which line of 30-inch pipe is to have a gate-valve at each end connected to branches in the said 36-inch and 48-inch pipes respectively. To this line of 30-inch pipe underneath the floor of said house, and by means of 30-inch x 30-inch x 20-inch T-branches therefrom extending upward through the floor and along the surface thereof, there shall be one line of 20-inch pipe extended to each end of the two groups of filters, and there connect with the lower compartments of the said two groups of tanks, as hereinbefore described.

39. From the foregoing four lines of 20-inch wash water supply-pipes leading from the line of 30-inch pipe described in the last paragraph, there are to be twelve 20-inch branches, with gate-valves outside of the tanks, passed into and out of the ends of the lower compartments of the filter-tanks and extending through the entire length of said compartments. The two pipes to each compartment are to enter from opposite ends thereof, for the purpose of conducting therefrom the filtered water, and supplying thereto the wash water, all as illustrated upon the drawings. The 20-inch gate-valves in these several lines of 20-inch pipe are for use to at pleasure conduct the filtered water from the lower compartments of the tanks into the clear water reservoir, or the wash water to said compartments from the line of 30-inch clear water supply-pipe.

40. Inside of the lower compartments of the filter-tanks the 20-inch pipe shall be, on their lower quarter-circumferences, perforated with three-inch openings, by means of which the filtered water, after passing the sand layer, can be withdrawn from said compartment and conducted to the clear water reser-

voir, or the wash water conducted thereto, for the purpose of washing the sand layer. The number of these openings shall be such as to be the equivalent to the delivering capacity of the 20-inch pipes, and so spaced as to withdraw from the lower chamber of the filter-tank the filtered water equally from all parts thereof, and also to supply thereto the wash water equally to all parts thereof.

41. In each of these 20-inch pipes connected with the lower compartment of the filter-tank and the clear warter reservoir, is to be placed a vertical tank, 48 inches in diameter by 15 feet 6 inches long, containing an automatic floating weir as a filter-head compensator or regulator, with a 20-inch discharge-pipe extending downward into the clear water reservoir, which discharge-pipe is to be lowered and raised in the vertical tank by a float with weir in it, and is to conduct the water from the tank level over the sand layer to that in the reservoir under the floor, on the same hydraulic principle or gravity force as does a turbine and its draught-tube conduct the water from the level of the head-race to that of the tail-race. In the case of the turbine, the

purpose is to develop a desired amount of mechanical energy; in the case of the filter, to pass a desired volume of water—corollary; in each there is obtained an approximately uniform rate of flow.

42. These regulators shall be fitted to the effluent-pipes of the filters as inverted siphons with a floating delivery weir for regulating the rate of effluent from the filters, which shall consist of the following parts:

43. One 48-inch x 48-inch x 20-inch flanged tee, 3 feet 5 inches high.

44. One bottom cover to flanged tee, with one 20 inch brass-bushed water-packed nozzle for the passage of the floating-weir tube.

45. One 48-inch flanged cylinder, 12 feet high.

46. One 20-inch internal diameter aluminum floating weir tube, 15 feet long.

47. One annular, U-shaped in section, sheet-brass buoy, attached to the upper end of the weir tube named in last paragraph.

48. The 20-inch aluminum weir tube shall be externally turned and smoothly finished, so it may pass freely through the bottom to the flanged tee

named in paragraph 44, approximately water-tight. The interior of the weir tube need not be finished. The metal of the weir tube shall be one-quarter of an inch thick, finished dimensions.

49. The interior of the 48-inch cylinder and tee named in paragraphs 45 and 43, shall be lined with Portland cement mortar one inch all around, which lining shall afford a non-corrosive coating to the cast-iron, shall be smoothly finished, concentric with the axis of the cylinder, and provide the upper guide for the buoy of the floating weir tube.

50. Near the upper and lower ends of the U-shaped in section sheet-brass floating weir buoy there shall be 6-inch x ¾-inch reinforcing rings, securely brazed to the sheet-brass buoy, turned on the outside, smoothly finished, and be concentric with the axis of the weir tube and the 48-inch cylinder as guides for preserving the alignment of the floating weir tube during its rise and fall in the 48-inch cylinder. The buoy at the upper end of the floating weir tube is to be adjusted by weights so that the crest of its weir tube will be submerged sufficiently deep below the water surface to permit the

rate of filtration per acre per twenty-four hours determined upon to flow into the weir tube, and thence fall by gravity through said tube into the clear water reservoir below the filter-house floor. The degree of submergence of the weir crest can be increased or decreased by weighting the buoy to a greater or less extent, and thereby determine the rate of filtration. The action of the floating-weir is as follows: When a filter-tank is filled with water and the connection between it and its weir tank opened, the water in its 48-inch cylinder surrounding the floating weir will rise therein to the elevation of the water in the filter-tank less the friction head due to the passage of the water through the sand layer, strainers, and pipes, with the weir submerged as determined by the construction and weighting of the buoy; so that, when the pipe connections between the lower compartment of the filter-tank and filter-head regulator are opened, passage of water through the sand layer (filtration) and discharge over the weir tube into the clear water reservoir under the filter-house floor will commence. As the sand layer clogs, the friction head increases, the

level of the water in the 48-inch cylinder falls, the buoy follows and maintains the depth of the weir submergence constant at all times. As the clogging of the sand layer and the friction head increase, the buoy will sink farther and farther in the cylinder until it arrives at the bottom, when the filter will be operated under a head of 12.5 feet, at which point it is time to stop filtering and cleanse the sand layer.

51. There shall be attached to the bottom of each 48-inch cylinder, a vacuum pipe, leading to a vacuum gauge located in the operator's cabinet, where he can observe continuously the head to which the sand layer in any filter may be subjected.

52. At the sides of the ducts along the upper margins of the filter-tanks, as hereinbefore described, are to be weirs, over which to discharge the unfiltered water from the ducts into the tanks when filtering, and, when washing, the waste water over same from the tanks back into the ducts and therefrom into the 20-inch drain-pipe, all as illustrated upon the drawings.

53. At the northerly and southerly ends of the

group of three filter-tanks, there are to be erected operating platforms, constructed of plate and other forms of steel, with stairs and railings as illustrated upon the drawings, which, with the covered ducts between and alongside of the filter-tanks, will afford ready access to all parts for operating purposes. The tops of the plates covering the ducts shall be ragged like a carriage-step, by the use of a diamond point and hammer or its equivalent, so as to provide a secure footing for the men in passing to and fro while operating the filters.

SAND LAYER SUPPORT AND STRAINER SYSTEM.

54. In the twenty-ninth paragraph of these specifications there is described generally a diaphragm to be placed in each filter-tank, at about three feet above its bottom. Said diaphragm is to consist of transverse I-beams, of suitable size and sufficient in number to support the weight of the sand layer and resist all other stresses to which they may be subjected. Upon these I-beams are to be placed mats of wire cloth, composed of three or more sheets—

say, first, a brass wire cloth, made of No. ..... ($\frac{7}{16}$-inch) square-drawn wire, with one mesh to two inches; second, one made of No. 13 brass wire, with five meshes to the inch; and third, one made of No. 31 brass wire, with forty-five meshes to the inch, or their equivalent in other numbers of cloths and sizes of wire and mesh. The first two cloths, or such number as found needful, are to be rolled to flatten the individual wires, stiffen the cloth, and bring it to as close an approximation to a plane as may be found practicable, similar to the treatment of wire cloth for malt-house floors. These cloths are to be fastened together at intervals of say 2 by 2 inches, or other intervals, with brass rivets. The mats thus constructed of three or more sheets of wire cloth are to be laid on and supported upon steel I-beams, placed transversely across the filter-tanks at intervals of about 3 feet 9 inches between centers, at an elevation of about 3 feet from the bottom. These mats shall be made in lengths sufficiently great to go clear across the tanks transversely; the wires of the lower cloth are to penetrate the sides and ends of the filter-tanks through properly punched holes

therefor, and riveted or bolted water tight on the outside. The mats are to be made in widths of 7 feet 6 inches and 30 feet 3 inches long, besides the length of the lower wires required to penetrate the sides and ends of the filter-tanks. Longitudinally of the filter-tanks the upper two mats of wire cloth shall abut, be fitted closely together upon the I-beams with splices in the meshes of the lower cloth, and fastened thereto by drift-rivets driven through the meshes of the upper webs of the cloth and the individual wires of the lower web, as also into the upper flanges of the I-beams, so as to fasten the three or more webs of wire of the mat and the I-beams together along each side of the line of junction. The drift rivets shall be of brass, one-eighth of an inch in diameter. The office of the mats is to support the sand layer in each filter-tank, and to transmit all weights and stresses to the I-beams inside above the bottoms of the filter-tanks.

55. The mat formed by uniting the three or more cloths, fastening them together and to the I-beams, is to perform the joint office of carrying or resisting all stresses, and at the same time consti-

tute what is ordinarily called the strainer system in mechanical filters.

56. This departure from all previous methods of constructing the sand support and strainer system is made, among other reasons, for the purpose of supporting the sand, withdrawing the water therefrom during the operation of filtering, and passing in the wash water in a reverse direction for washing the sand layer, all in a manner which will withdraw from, and inject into, the lower portion of the sand layer the filtered and wash water, respectively, and distribute such action uniformly over the entire horizontal sectional area of the filter-tank, a result not accomplished by any hitherto devised method of sand support, water passage, or strainer system for either filtering of water or washing of sand; the contention here being that the closer the approximation to a uniform rate of flow of water through every square inch of horizontal tank section, the more efficient will be the process; that is, the more water will be clarified in a unit of time for a given area of filter surface, and the smaller the proportionate volume of wash water required to keep the sand layer clean.

This wire-cloth mat substitute for cone valves, strainer cups, perforated tubes, slotted tubes and all like devices, will obviate a great fault common to them all; that is, local and unequal draught from the sand layer while filtering; and nozzle effect, with local and unequal currents in the process of washing the sand layer.

GATE-VALVES.

57. The thirty-eight gate-valves, embracing twenty-eight 20-inch, two 30-inch, six 36-inch, and two 48-inch, are each to be operated by an electric motor, which may have its armature shaft coupled directly to the screw-stems of the gate-valves in each case, or through such intermediate devices as may be needed, but in such manner as to reduce the mechanism to the fewest and simplest parts, and to operate the various gates with the greatest facility and dispatch. The consumption of time involved in operating valves in the process of water purification by mechanical filters constitutes a very large percentage of the total time. It is therefore of great

importance that these valves be operated by the simplest and quickest devices, which it is believed can be secured by the adoption and use of electric motors.

58. The wires and insulators, the switches, keys or plugs for manipulating the motors which operate the gate-valves, the volt-meters, am-meters, the necessary water-level and pressure gauges, which latter may be of the continuously recording type or equivalent acceptable type, a standard clock or chronometer, with all necessary pipes and valves for drawing samples from which to judge currently of the proper functions of all the divisions into which the purification process is divided, are all to be furnished, properly put up, connected, and mounted upon switchboards, or in cabinets, located at the north or south ends of the filter-house, to serve the northerly and southerly groups of filter-tanks, respectively. By this arrangement one man alone can operate a group of filters, have constantly before him the various conditions of the process, and thereby will be enabled to judge promptly, without moving from his post of observation, what is going on, or what regu-

lation is necessary in order to maintain an effluent continuously satisfactory in quality and at uniform rates of flow. By such an arrangement the judgment and the most important numerical observation record of but one man is to be relied upon, and consequently a greater degree of discipline and efficiency of service maintained.

59. The screw-stems of the several gate-valves hereinbefore enumerated shall be of the best quality of Tobin Bronze, and have the diameters of the stem at the root of the screw-threads of the following dimensions:

For 20-inch gate-valves 2⅜-inches in diameter.

"	30	"	"	3½	"	"
"	36	"	"	4	"	"
"	48	"	"	5	"	"

and the collars of these screw-stems shall also be of Tobin Bronze and screwed to the stems with a V thread about half the depth of the square thread on the screw-stem, and, in addition thereto, the collar shall be further secured by being brazed to the screw-stem, or the collars may be secured to the

stems in such other manner as may be acceptable to the Water Company.

60. All glands, stuffing-boxes, collar bearings, where the screw-stem passes through the dome of the case, are to be brass-bushed, so as to have no contact between the brass screw-stems or collars with the cast-iron. The gland bolts of the stuffing-boxes are to be of brass.

61. The discs for the gate-valves are to be of cast-iron, with brass mountings for the valve facings.

62. All the wedge pieces, upper and lower sections, are to be made of solid brass, with threads cut into the solid metal and not in the bushing pieces. The brass shall be of such quality as will be acceptable to the Water Company.

63. All machine work, fitting up, making joints, number and size of bolts, bolt holes are to be done in the best workmanlike manner.

64. All the gate-valves shall be constructed and fitted up under the inspection of the Water Company's agent; and, after having been constructed and fitted up, each of the gate-valves to be placed under the floor level of the filter-house shall be subjected

to a hydrostatic pressure of 300 pounds per square inch; and those to be located above the floor level of said house, to 200 pounds per square inch; under which all joints, gate faces, bolts and packings are to be water-tight, and no part of any of the valve cases or bodies shall spring more than one-sixteenth of an inch in any direction upon applying the said hydrostatic pressure to the inside of them.

65. These gates are to be operated by electric motors, and therefore the screw-stems shall be left without nuts, spur, or bevel gears; but instead, shall be so finished as to have connected with them, by key-ways or equivalents, a worm-wheel or other device for receiving electric energy to operate them.

AGITATOR.

66. The agitator is to be a mechanical contrivance for stirring the sand in the filter-tanks during the process of water washing it, by means of seventy-two rotating vertical shafts fitted with radial spines.

67. It comprises the following mechanical devices:

First—An electric traveling-crane, sup-

ported upon, and to travel on, ways placed on the side walls of the filter-house, the bridge of which crane will occupy a horizontal space of 110 feet wide by 150 feet long. The bridge will consist of five pairs of girders spanning the house transversely, which girders are to be united horizontally by beams, ties, and struts, so as to form the said bridge of the traveling-crane. The bridge is to be supported upon ten trucks, the wheels of which are to travel on the above named ways along the sides of the filter-house. The bridge is to be operated by a single electric motor, appended to the middle one of the five pairs of girders.

Second—A trolley, 32 ft. wide by 150 ft. long, horizontally connected by beams, ties, and struts, in such a manner as to cause the trucks to move synchronically upon the ways of the before named five pairs of girders spanning the house transversely, which trolley is to be operated by a single electric motor gearing into the end wheels

of the five trucks by which the trolley is to be moved.

68. The agitator is to be a horizontal grille, 30 feet 3¼ inches wide by 149 feet 6 inches long, composed of two longitudinal plate girders, connected transversely by thirty-six (18 pairs) I-beams, together with all needed horizontal strut and tie bracing, with vertical gusset and angle bar stays and connections. From the eighteen pairs of transverse I-beams there are to be suspended from each pair four agitators, seventy-two in all, which agitators are to be hung in cast-iron housings upon ball-bearings or fricton roller supports placed and supported upon the said 18 pairs of I-beams. The single members of agitator will consist each of a section of 4-inch wrought-iron tubing as a vertical shaft, weighing 20 pounds to the foot, fitted with collar and cap at top, worm-wheel 23 inches below the top, and ten spines, extending radially from the wrought-iron tubing, 4 feet length of radius, and placed circumferentially at angles of about 45 degrees with each other. Longitudinally of the grille these agitator members will be placed in four parallel rows, eighteen to a row, and, trans-

versely, eighteen rows four to a row. Upon the tops of the I-beams there are to be laid four lines of steel shafts, fitted with worms, gearing into the worm-wheels on the vertical hollow four-inch shafts, properly housed upon the said I-beam. Each of the four lines of shafting is to be operated by two electric motors of sufficient power to rotate eighteen agitators at the same time. The worms on the four lines of shafts shall be alternately right-handed and left-handed in their pitch, so as to neutralize cumulative tension and compression therein. The radial spines on the vertical shafts of the seventy-two members are so placed in each with reference to those in the others that the entire group of the seventy-two can be rotated at the same time without said spines interfering with each other.

69. The grille of the agitator, with its four lines of worm-shafts and seventy-two agitator fans, is to be supported upon, or suspended from, a trolley consisting of ten trucks moving transversely across the house on top of the five pairs of girders of the traveling-crane bridge. There are to be ten steel screw suspension rods, depending from ten bolsters in the

trolley trucks, with ball and socket supports, so as to permit the agitator grille to swing freely and allow the worm-wheel nuts to more readily adjust themselves at right-angles to the axes of the suspension screws. By means of the ten suspension screws, worm-wheel nuts and worm-shafts, the grille is to be lowered into the filter-tanks and lifted therefrom in a vertical direction, the lowering and lifting being accomplished by rotating the worm-wheel nuts on said suspension screws by four lines of worm-shafts, operated by eight combined electric motors, two on each line of shaft. The grille is to move transversely from tank to tank in each group by a single electric motor operating the ten trolley trucks from which the grille is suspended. The grille, complete, will weigh about 65 tons, which weight is to be transferred to the trucks of the trolley by the ten screw suspension rods before named, through the trucks to the bridge of the traveling-crane, and thence to the walls of the house.

COAGULATING DEPARTMENT.

70. This division is to be devoted to the preparation of the sulphate of alumina solution as coagulant, and the introduction of the same into the subsided water for coagulation before the water enters the filters. It will consist of nine principal parts, viz:

71. First—A house 60 feet by about 120 or less feet in plan on the outside and 67 feet high above the filter-house floor.

72. Second—A steel precipitating tank or stand-pipe 50 feet in diameter, erected on a foundation plane 14 feet below that of the filter-house floor, and is to extend 61 feet high above the said floor, or 34 feet above high water in Crescent Hill Reservoir. The tank or stand-pipe is to be fitted with 48-inch inflow and outflow nozzles, a 48-inch floating weir pipe and a meter, which, all taken together, are to perform the functions of admitting and measuring the settled water from Crescent Hill Reservoir into it,

coagulating it and emitting it therefrom to the filters, all as hereinafter described.

73. Third—Four concentric steel-plate sulphate of alumina dissolving tanks, 25, 35·35, 43·3, and 50 feet in diameter, respectively, and 25 feet high above lower section of pipe.

74. Fourth—One steel-plate feed-tank, 10 feet in diameter and 5 feet high, into which the sulphate of alumina solution from the four preparing tanks is to be received, and from it, under an uniform head, delivered to the feed-pump hereinafter described.

75. Fifth—A bronze or aluminum, acid-proof, 48-inch in diameter, horizontal turbine-meter, set upon the horizontal flange of a 90-degree vertical elbow to be connected with the line of 48-inch pipe entering the tank from Crescent Hill Reservoir.

76. Sixth—A bronze or aluminum, acid-proof, piston pump, to be operated from the vertical shaft of the turbine-meter last named for feeding the alumina solution at

a rate varying with the rate of inflow of the settled water from Crescent Hill Reservoir into the precipitating tank.

77. SEVENTH—A floating weir in the stand-pipe, by means of which the coagulated water will be withdrawn from near the surface in said stand-pipe and discharged into the 48-inch main leading to the branch pipes supplying the filters.

78. EIGHTH—All necessary pipes, valves, fittings, and equipments, necessary for making the above enumerated parts perform their functions for the purposes intended.

79. NINTH—The equipments hereinbefore enumerated in paragraphs 73, 74, 76, and 78, with all the appurtenances thereunto belonging, are to be located in the upper story of the coagulating house and upper section of the stand-pipe, at such an elevation above the sulphate of alumina solution feed tank as will permit the solution to be fed by gravity into said tank

from the tanks described in paragraphs 73 and 74.

80. The greater proportion of the space in the coagulant house will be occupied by the precipitating tank or stand-pipe; the remainder of the space, on all sides thereof, will be devoted to storage rooms, chemical laboratory, and such uses as may arise therefor. The height of the vacant space can be divided into such number of stories as may best suit the requirements of the service. The upper floor of the house will be utilized for placing and operating the coagulant devices as hereinafter described. The house will be provided with both a stairway and an electric elevator, for the purpose of convenient and speedy communication with the several floors thereof, as also for elevating supplies to the coagulant floor. The house, with the floors and stairway, is to be built by the Water Company and is not to be considered as a part of the filter contract.

81. The precipitating tank or stand-pipe, as before stated, will be 50 feet in diameter, 75 feet high above its foundation, and 61 feet high above the

filter house floor. The foundation of this tank or stand-pipe will be on a level bed of concrete fourteen feet below the level of the filter-house floor, making the total height of the tank or stand-pipe 75 feet. (The Water Company will build the concrete foundation.) This tank is to be built of plate-steel, in fifteen rings, 5 feet in height each, exclusive of lap. The bottom of the tank is to be also of plate-steel, with a dome-inverted or spherical-shaped section with a versed sine of 20 inches, or flat, if preferred by the Water Company.

The thickness of the bottom is to be ..... inches.

"	"	"	sheets in the 1st ring,				¾	"
"	"	"	"	"	2d	"	$\frac{11}{16}$	"
"	"	"	"	"	3d	"	⅝	"
"	"	"	"	"	4th	"	$\frac{9}{16}$	"
"	"	"	"	"	5th	"	½	"
"	"	"	"	"	6th	"	$\frac{7}{16}$	"
"	"	"	"	"	7th	"	⅜	"
"	"	"	"	"	8th	"	⅜	"
"	"	"	"	"	9th	"	⅜	"
"	"	"	"	"	10th	"	½	"
"	"	"	"	"	11th	"	½	"

The thickness of the sheets in the 12th ring, $\frac{5}{16}$ inches.

" " " " " 13th " ¼ "

" " " " " 14th " ¼ "

" " " " " 15th " ¼ "

82. The circumferential joints of the tank or stand-pipe are to have a lap of six inches, and be double-riveted with ¾-inch rivets, placed with a pitch of three inches. The vertical joints shall abut with a cover-plate twelve inches wide on the outside, and be double-riveted with ¾-inch rivets with a pitch of three inches. At the upper end of the tank there shall be a continuous angle bar 3-inch x 3-inch x ½-inch in section, surrounding and riveted to the tank with ¾-inch rivets placed with a pitch of three inches, so as to stiffen the tank as also to make a water-tight joint between the tank and said angle bar. The sections of the angle bar shall be made as long as practicable so as to reduce the number of joints, where splices will have to be made securely and water-tight.

83. On the northerly and southerly sides of the center of the tank or stand-pipe, at elevations coincident with the grade of the 48-inch supply main,

there shall be placed two cast-iron nozzles 48 inches in diameter, to admit and emit the settled water before and after coagulation, respectively, flanged to the curvature of the side of the tank and riveted thereto with two concentric rows of 1-inch rivets with a pitch of three inches, which nozzles shall be each 12 inches long, the inner ends ending with faced and drilled flanges placed at right angles to their axes, and their outer ends with the ordinary form of cast-iron sockets on 48-inch cast-iron pipe.

84. To the 48-inch inflow nozzle inside of the tank there shall be attached a bronze or aluminum, acid-proof, 48-inch meter, of the horizontal turbine type, with its shaft suitably supported at the bottom, to extend vertically to the top of the tank or stand-pipe, which meter is to measure the volume of the inflowing water, and from the shaft of which some mechanical energy (or power) is to be transmitted for purposes and to points to be hereafter described. The meter is to be of special design, of large diameter, so as to pass the requisite volume of water at low speed, say ten revolutions per minute. If found

necessary, the 48-inch inflow nozzle can be increased in diameter.

85. To the 48-inch outflow nozzle inside of the tank is to be attached the delivery end of a 48-inch vertical floating tube and weir, to be erected in the stand-pipe, for the purpose of emitting the coagulated water therefrom to the filters, always taking the water from, at, or near the surface of the water in said tank or stand-pipe.

86. To the steel storing and distributing tank (see paragraph 72) there shall be attached a bronze or aluminum piston pump, for feeding and regulating the sulphate of alumina solution to the inflowing water below the meter described in paragraph 84. This pump shall be duplicated in all its parts ready for substitution and reciprocal service, be of the internally-packed plunger variety, and be connected directly with a disc-crank on the upper end of the vertical shaft of the meter described in said paragraph 84. The connection between said disc-crank and the pump shall be made by means of a crank-pin and connecting-rod, cross-head and guides. The pump shall be located at such elevation on the

receiving, storing, and distributing tank as to always have its suction submerged by the sulphate of alumina solution. The displacement of this pump per revolution shall be such as shall deliver a one per cent. sulphate of alumina solution at such rate as to supply one-quarter of a grain of sulphate of alumina per gallon of water with a stroke of one inch, and so designed and constructed that this stroke may be extended to thirty-two inches in length by manual adjustment while the meter and pump are in motion. This variation of stroke from one to thirty-two inches in length will therefore enable the sulphate of alumina application to be varied from one-quarter to eight grains per gallon of water. The manual adjustment here spoken of can be accomplished by placing the crank-pin for the connecting-rod between the pump and the meter-shaft in a sliding block placed in a slotted disc-crank, which sliding block and crank-pin can be, by the use of a hand-ratchet operated a micrometer screw, so adjusted as to gradually increase or decrease the length of the crank radius by sliding the block from or towards the center of the meter-shaft, thereby increasing or

decreasing the length of pump stroke and the volume of sulphate of alumina solution correspondingly.

87. The delivery from this pump of sulphate of alumina solution shall be discharged into a capacious and open-ended pipe, above high water level in Crescent Hill Reservoir, so that the solution will find its way by gravity through properly arranged pipes to the settled inflowing water under the meter hereinbefore described.

88. By this arrangement a one per cent. sulphate of alumina solution can be fed into the settled water at rates that will add from one-quarter to eight grains per gallon of water.

89. The foregoing aluminum solution feed devices are positive; by the use of them there is no danger of failing to feed at the desired rate, excepting alone the modification of it by the slip or lost action in the sulphate of alumina solution feed and regulating pump. This pump can be constructed and operated with such precision as to maintain an efficiency of not less than 98 per cent., subjecting the application of the sulphate of alumina solution to a possible variation of two per cent. from the de-

sired volume, and the sulphate of alumina to one-five-thousandths of one per cent. from the desired weight. This, it is believed, is as close an approximation to uniformity of application as is practicable, depending, as it does, upon the single function of the pump's efficiency. The adjustment of the crank-throw can be made along a graduated scale, with pointer that will make legible the grains per gallon of aluminum sulphate which is being applied. The scale used must be graduated to read grains, or fractions of a grain, of aluminum sulphate per gallon of water for a 1 per cent. solution as standard. If other solutions are used, they must be multiples of the standard solution, and shall from it increase or decrease in strength in geometrical ratio corresponding to an increasing or decreasing series in the rate of grains per gallon, so that the readings of the scale may be readily converted into grains per gallon by the use of the proper multiplier or divisor applied to the solution of greater or less strength than the standard solution; which is to say that, with a one per cent. solution, the scale reads grains of sulphate of alumina per gallon of water. With

greater or less strengths of solution, the readings will be the same multiples of the one per cent. solution readings as the solution then in use is of the one per cent. solution. Hence, with the adjustable crank-throw in the disc on the meter-shaft and the known strength of the sulphate of alumina solution, the rate per gallon in grains can be at any time varied as required, simply by shifting the crank-pin, and at the same time determine it by a reading of the scale, or the application of a proper multiplier or divisor to such reading. The pump is to be a simple meter and regulator of the application of sulphate of alumina solution, work under low head, discharge the solution into an open-ended pipe, whence it is to flow by gravity into the inflowing water under the meter.

90. Throughout the coagulating department, for the purpose of protecting the iron against corrosion from the sulphate of alumina solution, the pipes shall be of the ordinary wrought-iron screw-jointed kind, lead-lined. The crosses, tees, elbows, and fittings shall be similarly lined. All valves throughout shall be of acid-proof bronze. The stand-pipe,

the receiving, storing, and distributing-tank, and all ducts and passages made of iron or steel coming in contact with the sulphate of alumina solution, wherever found practicable, shall be lined with Portland cement mortar to a thickness varying from three-quarters to one inch. The steam pipes and fittings shall be of the ordinary wrought-iron kind, fitted with brass valves.

SAND.

91. The sand layer in each filter-tank shall be 36 inches deep, aggregating 484 cubic yards to each tank. It shall be Ohio River sand, 0.42 millimeters in effective size, with a uniformity coefficient of 1.80 —subject to such modifications as may, upon further investigation, be found most expedient, both as regards effective size and uniformity coefficient. The sand must be absolutely clean from soil, clay, and all foreign substances. The foregoing requirements make it necessary that the sand be thoroughly washed, screened, and graded, so as to meet the effective size and uniformity coefficient requirements.

92. For the purpose of sterilizing the sand layer in each of the three filter-tanks, there shall be introduced two sets of three 3-inch steam pipes from opposite ends of each filter-tank, making six to a tank. These pipes are to be suspended from the I-beams which support the strainer system and sand layer. The said 3-inch pipes inside of the filter-tanks are to be perforated along their upper one-third circumferences with one-quarter inch holes spaced at intervals of one inch between centers. Each of these pipes is to have a valve outside of the filter-tank. There shall be two main steam pipes, one for each end of the southerly group of filters, which are to extend from the easterly tank across the house westwardly and terminate in a valve inside of the house wall. The pipe shall be ordinary wrought-iron steam pipe and fittings, with brass valves.

GAUGES.

93. The gauges shall be of the best design and construction and be approved by the Water Com-

pany. They shall all be 12-inch diameter of dial with nickel-plated cases. They shall be connected in the most approved manner, as located and approved by the Water Company.

94. There shall be six pressure gauges connected to the wash water supply pipes where they enter the lower compartments of the filter-tanks, be piped to and put up in the observation cabinet in the south end of the filter-house. They shall be combination gauges, and graduated to read both pressure in pounds and height in feet, 150 and 345, respectively.

95. There shall be six vacuum gauges connected with the floating weir, piped to and put up in the observation cabinet at the south end of the filter-house, which gauges shall read the vacuum in pounds as well as feet, 15 and 35, respectively.

96. There shall be two vacuum gauges to indicate the depth of water in the clear-water reservoir, and its elevation plus Plane of Reference. One of these gauges is to be located at the southerly end of the filter-house and the other at the northerly

end; they shall be graduated to read pounds and feet, 15 pounds, and 35 and 148 feet, respectively.

97. There shall be one pressure gauge, graduated to read pounds pressure and feet height, connected with the stand-pipe or precipitating tank, piped to the observation cabinet and there put up, 50 and 120, respectively.

98. There shall be two combination pressure recording gauges, graduated to read to pounds and feet, 150 and 345, respectively, one connected with the 36-inch clear-water supply main to the city, put up in the northwesterly corner of the filter-house, and the other with the 48-inch clear-water main to the city and located in the southwesterly corner of the filter-house.

99. All the foregoing gauges will be of standard construction, such as the Water Company may select, except the dials, which, on account of their location and service, may have to be specially graduated, to read as heretofore specified. The tablets upon which the gauges are to be mounted shall be variegated black marble, polished, of such quality, design, and finish as the Water Company may select.

CHRONOMETERS.

100. There will be required one chronometer for the filter-house and one for the coagulant-house, each of which is to be a first-class 30-day timepiece designed and constructed for electric regulation. They are to be pendulum clocks. The diameters of the dials shall be large enough to have graduated circles two feet in diameter, engraved with bold-faced Roman numerals, the clocks fitted with hour, minute, and second hands, and also to indicate the days of the month. These clocks are to be furnished and put up on proper hard-wood tablets fastened to the wall at such places as the Water Company may select.

SULPHATE OF ALUMINA SOLUTION TANKS.

101. These tanks shall be four in number, rest upon and be formed in the top of the 50-foot diameter stand-pipe described in paragraphs 72, 81, 82, and 83 of these specifications, for which pupose the upper six rings will be used, five feet in height each, excluding lap.

102. From the lower section, above the angle bar at its top, as described in paragraph 82 of these specifications, the upper section is to be added to a height of 30 feet, nine feet of which height is to be utilized for erecting ten radial trusses internally across the 50-foot pipe for the purpose of supporting the floor and contents of the upper section. The plates forming the bottom of the upper section are to be connected with the sides thereof by having upward flanges riveted to the exterior shell of said upper section at a height of nine feet above its bottom, at which height the floor is to be supported on the ten radial trusses before named. The upper section is to be divided into four compartments of equal volumes by the introduction of three smaller stand-pipes inside of the larger, riveted to the flat bottom of the upper section of the pipe, and stayed radially to each other and to the outer shell of the upper section. The four cylindrical, concentric tanks thus formed will be 25, 35·35, 43·3, and 50 feet in diameter, respectively. The one in the center will be a vertical cylinder 25 feet in diameter, and the other three will surround it in the form of

annuli, be equal to each other and the central tank in volumetrical capacity. In these four tanks, in two at a time, the sulphate of alumina solution is to be prepared, and, when ready and needed, to be drawn therefrom through pipes by gravity into the receiving and regulating tank connected with the pumps described in paragraph 106 of these specifications. Near the upper ends, surrounding the outside of tank No. 2 and enclosed in tank No. 4, there are to be trays for holding the undissolved sulphate of alumina, which trays shall be each a quarter-circle in section of 24-inch radius, in which the sulphate of alumina to be dissolved is to be placed, and through which the water for solution is to be passed by the circulating pumps in the process of solution. After this upper section of the standpipe (the four sulphate of alumina solution tanks) has been completed, it is to be thoroughly cleaned, dried with a hot air blast, and is to receive three coats of asphaltum paint such as the Water Company may select; or, if preferred by said company, this upper section, like the lower, shall be coated with Portland cement mortar three-quarters of an

inch thick. For the purpose of ventilating and lighting, and affording in and egress thereto and from, there shall be two circular openings, six feet in diameter in the clear, cut through the north and south sides of the upper stand-pipe, diametrically opposite to each other. The steel plates, where these holes are to be cut, are to be three-quarters of an inch thick, and reinforced on the inside by riveting around the margins of the circular holes, crownless hats, made out of 6-inch x 6-inch x ¾-inch steel angle-bars, riveted with ¾-inch rivets staggered with a pitch 2½ inches. The crownless hats shall be made by welding the angle-bars and shaping the hats so as to fit the interior circumference of the stand-pipe. The center of these six-foot openings shall be four feet above the top of the lower section of the stand-pipe.

SULPHATE OF ALUMINA FEED-TANK.

103. In the northwestwardly corner of the coagulating-house there shall be placed a steel-plate sulphate of alumina feed tank, 10 feet in diameter

and 5 feet in height, into which the solution is to be delivered from the solution-tanks, and from which it is to be drawn by the bronze or aluminum acid-proof feed pump for delivery to the settled inflowing water to be coagulated in the stand-pipe. This tank is to be supported at such an elevation as to provide a satisfactory feed-head to the above named pump. Internally, the sides and bottom of this tank are to be lined with Portland cement mortar to the thickness of three-quarters of an inch, the same as provided for the stand-pipe in paragraph 90.

PIPES IN COAGULATING-HOUSE.

104. The coagulating-house is to be fitted with one line of wrought iron, screw-jointed, lead-lined pipe, seven or eight inches in diameter, starting from a gate-valve near the curbstone in the sidewalk on Frankfort Avenue, on the north side of the coagulating-house; extend thence across the sidewalk, through the walls of the house, and vertically in the northeast corner of said house to a level with the bottom of the sulphate of alumina solution-tanks; thence

horizontally southwardly along the easterly wall of the house to the middle on the easterly side of the stand-pipe; thence at right angles westwardly to connect with the bottom of the four compartments forming the sulphate of alumina solution-tanks in the upper section of the stand-pipe, and connect by means of three 7-inch x 7-inch x 7-inch tees, one 7 or 8-inch ell, six 7 or 8-inch nipples, and three 7 or 8-inch gate-valves, all as illustrated upon the drawings, and for the purpose of supplying filtered water severally to the two pairs of sulphate of alumina solution-tanks.

105. On the west side there shall be a similar lead-lined 7 or 8-inch pipe connection with the bottom of the several solution-tanks by nipples, gate-valves, ell, tees, and extend westwardly to the westerly wall of the coagulating-house; thence horizontally northwardly along said wall to connect with the sulphate of alumina feed-tank by means of proper fittings and a ball float-valve to regulate the level in said tank, which last line of pipe, with its valves and fittings, is for the purpose of withdrawing the sulphate of alumina solution from the solution-tanks

and delivering it to, and regulating in, the sulphate of alumina feed-tank, the supply to the regulating pump heretofore described and provided for. There shall be two pairs 8-inch rotary pumps (four in all) to each pair of sulphate of alumina solution tanks, for circulating purposes. They are to be operated by electric motors.

106. One line of 6-inch drain and waste pipe, extending from upper floor in coagulating-house, and to have such fittings and connections with valves as will enable all the waste fluids from the several floors to be carried down and discharged into the 20-inch stoneware drain-pipe.

PUMPS.

107. There shall be two bronze or aluminum, acid-proof, double-acting plunger, internally-packed, sulphate of alumina solution pumps, each 18½ inches in diameter, and of a stroke varying from 1 inch to 32 inches. These pumps are to be furnished in duplicate, so that they may be used interchangeably and subjected to such repairs as will maintain

constantly the requisite delivery efficiency to properly regulate the rate of sulphate of alumina application to the settled water before entering the filters. The pumps, one at a time, will be located inside the stand-pipe near its top, and will be actuated by a disc-crank on the upper end of the vertical shaft of the combined meter and motor described in paragraphs 75, 84, 86, and 87. The disc-crank is to be so constructed as to operate a revolution counter which shall be so geared as to register gallons of water passed by the meter-motor.

ELEVATOR.

108. There is to be one electric elevator in the southeast corner of the coagulating-house, capacity 3,000 pounds, lift 75 feet. The construction of this elevator shall include everything needed for completing it ready for service, comprising cage, safety appliance, wire net surrounded well, with sliding doors at top, bottom, and on two intermediate floors; it shall be of the most approved design and

construction in all its parts. The electric energy for operating it will be furnished by the Water Company, properly wired to the inside of the coagulating-house.

ELECTRIC MOTORS.

109. The electric motors required for the various purposes named in the specifications, such as are needed for the traveling-crane, agitator, electric elevator, circulating pumps, etc., are to be furnished in connection with those details as parts thereof, and be embraced in the contract therefor. In addition to these there shall be manufactured, furnished, delivered, and put up at and in the filter-house the following electric motors for operating the gate-valves which control the flow of water to and from the filters, which are to be furnished under a separate contract:

28 one-horse power motors for operating 20-inch gate valves inside of filter-house.

2 two-horse power motors for operating 30-inch gate-valves outside of filter-house.

2 three-horse power motors for operating 36-inch gate-valves outside of filter-house.

4 three-horse power motors for operating 36-inch gate-valves inside of filter-house.

2 four-horse power motors for operating 48-inch gate-valves outside of filter-house.

Those on the outside of the house shall be placed in concrete vaults, built underground by and at the expense of the Water Company.

Electric energy for all these, including wire cables to the motors, will be furnished from the main power station by and at the expense of the Water Company.

All these motors must be completed, ready for connection with wires and service.

POWER.

110. The power required for the various purposes in the filter and coagulant-houses will be derived from electric energy, which will be developed at the main power station at the expense of the Water Company, and wired to the filter and coagu-

lant-houses, to be there used by the various motors required therein.

HEATING OF BUILDINGS.

111. There shall be two systems of heating apparatuses, one for the main filter-house and the other for the coagulant-house, which apparatuses are to be separate and distinct from each other. Each system shall be capable of heating its house to 60 degrees Fahrenheit when the thermometer reads 10 degtees Fahrenheit below zero in the open air.

112. Systems of steam and electric heating devices will be considered. If a steam system is adopted, the main steam pipe will be brought, by and at the expense of the Water Company, to the filter-house, inside the west wall, approximately in the center thereof, and to the inside of the south wall of the coagulant-house, approximately in the center thereof; if an electric system is adopted, the main wires thereof will enter and terminate inside of the houses at points similar to those of the steam pipes.

LIGHTING.

113. The light for the coagulant and filter-houses shall be obtained from the use of both arc and incandescent lamps, of such number and candle-power as may be deemed necessary. The arc lights shall be used for general lighting sufficient in degree to conveniently and successfully perform all ordinary running operations and manipulations, while the incandescent lamps shall be used at such places and in such numbers where desired and needed, and where close reading or inspection has to be made and clerical work performed. The electric energy for lighting purposes will be developed at the main power station, and wired to and through the outside walls of the coagulant and filter-houses, about midway of their westerly and southerly walls, respectively, by and at the expense of the Louisville Water Company.

GENERAL PROVISIONS.

114. In the construction of the different parts of the work hereinbefore specified and described, the several contractors, in their modes of operation, in their order of proceeding, and in their selection and use of appliances and devices for erecting their parts, have liberty of choice only so far as is consistent with the success of all the parts embraced by the different contracts, as well as the whole. No mode of operation or procedure which tends to impair the usefulness or make unsuccessful any part, will be permitted to be adopted and used by any of the contractors. The success of no part will be allowed to hinge upon the impairment or failure of another; the success of the work in its entirety is what is to be accomplished.

115. Any modification of these plans and specifications which bidders may desire to make must not be made by interlineations of the specifications or the proposals, for this will make such proposals informal and cause their rejection. All proposals

must be formal; and if bidders desire to propose differently, they must do so by separate written communications enclosed in the same envelope with the formal proposal. In this form, suggestions or proposals outside of the specifications will receive such consideration as they may be entitled to consistently with the Water Company's interest.

116. Throughout the foregoing specifications, wherever it is provided that parts are to be furnished and erected by one contractor in conjunction with other parts to be furnished and erected by other contractors, and thus involve two or more contracts, the parties having such divers contracts shall, when it is necessary to the success of the work, cooperate, work jointly, so that each may be assisted by the other and not obstructed. This clause is binding upon all contractors who may furnish materials — parts of the filter system — and erect and connect them at the proper time in their correct relations and positions with reference to the whole, at the same time that other contractors may be similarly occupied. No contractor is to have precedence in availing of erection space or facilities over

another contractor any farther than the natural order in which one part of the system precedes another. The conflict of interests which must at times arise in constructions of this magnitude and complexity must be borne and adjusted in a spirit of compromise and friendliness, and in all such conflicts the Water Company's decision shall be final and binding upon all parties.

117. Throughout the foregoing specifications, more especially in the descriptive parts thereof, the work described is referred to as a whole, comprising six filter-tanks, which reference is correct only so far as it relates to the unfiltered water supply pipes being connected with the mains on the outside of the filter-house, brought into said house and terminated on the floor thereof, to the coagulating department, and the traveling-crane and agitator; that is to say, the underground pipes outside of, and through the walls into, the filter-house, the coagulating department, and the traveling-crane and agitator, are designed, and are to be built now, of sufficient capacity to operate six filter-tanks, but only three tanks, with their needful appurtenances,

are to be built and put in operation at the present time.

118. For the purpose of having the several parts of the described filtration system constructed and executed upon the most advantageous terms, the work has been subdivided under twenty-four different heads, as enumerated below; in the building, erecting, and completing of which, the several contractors shall employ skilled artisans and workmen and have the work done in the best workmanlike manner.

SUBDIVISIONS OF CONTRACT.

119.

Proposal I—For pipes, specials and gate-valves, outside of and under filter-house.

" II— " ways in filter-house to support an electric crane.

" III— " three filter-tanks.

" IV— " 20-inch, 30-inch, and 36-inch pipes, specials and gate-valves connected with three filter-tanks.

Proposal V—For gate-valves.

" VI— " six balanced 20-inch piston valves.

" VII— " six floating-weirs.

" VIII— " sand layer support and strainer system for three filter-tanks.

" IX— " electric traveling-crane.

" X— " agitator.

" XI— " electric motors.

" XII— " gauges and tablets.

" XIII— " filter sand.

" XIV— " one stand-pipe and four sulphate of alumina solution tanks.

" XV— " meter-motor.

" XVI— " pumps and slotted disc-crank.

" XVII— " floating discharge tube in stand-pipe.

" XVIII— " sulphate of alumina feed tank.

" XIX— " pipes, specials, and fittings in coagulant-house.

" XX— " galleries, platforms, floors, and stairs.

" XXI— " elevator in coagulant-house.

Proposal XXII—For two chronometers.

" XXIII— " lighting filter and coagulant-houses.

" XXIV— " heating systems in filter and coagulant-houses.

120. The foregoing specifications and the plans which they describe were prepared in obedience to a resolution passed as follows: At a regular meeting held by the Board of Directors on February 5th, 1900, it was resolved: "On account of the importance of the matter and with a view to the company getting more data and information, the Chief Engineer and Superintendent was authorized and requested to prepare plans, specifications, drawings and estimates of cost, of such a system of filtration as he thinks will fully meet the requirements and the best interests of the company in the premises."

CHARLES HERMANY.
Chief Engineer and Superintendent.

LOUISVILLE, KY., November 26th, 1900.

PROPOSAL I.

FOR CAST-IRON PIPES, SPECIALS, AND GATE-VALVES, OUTSIDE OF AND UNDER THE FILTER-HOUSE.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....
.....as principal ,
and.....
.....as suret....,
being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to furnish the materials and perform the work embraced and contemplated by paragraphs 5, 6, 9, 10, 11, 12, 13, 14, and 15, and others, if relevant of the introduction to and the specifications, and represented upon drawings, sheets Nos. 1, 1A, and 9.

We further agree that these parts shall be of the

best material of their kinds, sound in all respects, constructed and fitted after the most approved methods, coated with the best quality of coal-pitch varnish applied in the most approved method, transported to the Water Purification Station, and there erected and put in place, all under the supervision to the satisfaction and acceptance of the Louisville Water Company.

We will do all work of excavating, cutting pipe lines, removing old or superfluous parts, substituting new, and complete the same with the exception of cutting holes through the filter-house wall, which is to be done by the Louisville Water Company.

This proposal is submitted for the work, complete, in accordance with the plans and specifications combined. Any minor parts needed for completing the work as intended by drawing and specifications, are herein included and will be furnished, whether or not they are illustrated upon the drawing or enumerated in the specifications.

The total weight of cast-iron, lead, and gate-valves, entering into the before mentioned work is to be not less than.....pounds when completed.

We further agree to furnish working drawings, the materials, and perform the work bid upon, in conformity with the plans and specifications submitted to us for examination; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we here declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence any and all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any of the work awarded to us (except the acts of the Water Company), while said work is in progress, and until completed and accepted.

All the foregoing we propose to furnish, do, and complete inside of..... months from award of contract, for the sum of.....

.....($.....)

dollars.

We enclose a certified check in the sum of

.....

($.....) dollars, as a guarantee that if this work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret.....will be the.....

.....

which will execute a bond in the sum of.....

.....

($.....) dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL II.

FOR WAYS IN FILTER-HOUSE TO SUPPORT AN ELECTRIC CRANE.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret....,

being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to furnish the materials comprised in the ways for an electric crane described in paragraphs 67, 68, and 69, and others if relevant, of the specifications, and as represented on drawing, sheet No. 22.

The ways shall be built of steel girders of the form and dimensions, thickness of metal and size of

members, all as illustrated upon drawing, sheet No. 22. They shall be of mild steel, ultimate strength 60,000 to 70,000 pounds per square inch; elastic limit, not less than one-half the ultimate strength; elongation, 20 per cent. in eight inches; minimum reduction at area of fracture, 40 per cent. It shall bend cold 180 degrees to a diameter equal to the thickness of the piece tested, without crack or flaw on the outside of the bent portion. The cast iron shall be tough gray metal of the best quality. A cast bar, 5 feet long, 1 inch square, from which the skin has been removed, resting on supports 4 feet 6 inches apart, shall bear, without breaking, a weight of 500 pounds suspended at the center, with a deflection of not less than 1½ inches. The bolts and nuts shall be made of the best quality of rolled coke-made iron, such as used in bridge construction.

The ways shall be put up on the inside of the filter-house, along the easterly and westerly sides of the longitudinal walls, at a height of about 18 feet above the floor, resting and bolted upon cast iron plates resting on top of the pilasters along said walls of the house. The girders shall be spliced in

the middle of each cast iron cap, as illustrated upon the drawing, at which splice they are to be bolted by four one-inch bolts to each cap.

The rivet holes shall be drilled or punched and reamed; rivets, of the best.....'s steel rivets, driven carefully and solidly without the use of drifts. Rivets shall be cone, button, steeple, or countersunk, as the Water Company may elect.

The girders shall be placed, completely finished, upon the pilasters in the walls of the house, ready to receive the tracks of the traveling-crane. The steel plates, angles, etc., shall be delivered and put up free from rust, and thereafter receive a thick coat of raw linseed oil to protect them against rusting until finally painted, which is not a part of this contract.

The total weight of steel, cast iron and wrought iron, shall be not less than.....pounds.

This proposal is submitted for the work, complete, in accordance with the plans and specifications combined. Any minor parts needed for completing the work as intended by the drawings and specifications, are herein included and will be furnished,

whether or not they are illustrated upon the drawing or enumerated in the specifications.

We further agree to furnish working drawings, the material, and perform the work bid upon, in conformity with the plans and specifications submitted to us for examination; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we here declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence any and all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and water, by fire and by labor strikes, and all other risks, to any of the work awarded to us (except the acts of the Water Company), while said work is in progress, and until completed and accepted.

All the foregoing we propose to furnish, do, and complete inside of ..... months from award of

contract, for the sum of.....

.....($.....) dollars.

We enclose a certified check in the sum of

.....($.....)

dollars, as a guarantee that if the work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret.....will be the.....

.....

which will execute a bond in the sum of.....

.....($.....) dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

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PROPOSAL III.

FOR THREE FILTER-TANKS.

.....

.....

To the Louisville Water Company,

of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret....,

being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company, to furnish the materials and perform the work embraced and contemplated by paragraphs 27, 28, 29, 30, 31, 52, and 53, and others if relevant, of the specifications, which work is illustrated on drawings, sheets Nos. 9, 10, 11A, 12A, and 14.

The tanks shall be built of the form and dimensions, thickness of metal, and size of members, all

as illustrated upon the drawings. They shall be of mild steel, ultimate strength 60,000 to 70,000 pounds per square inch; elastic limit, not less than one-half the ultimate strength; elongation, 20 per cent. in eight inches; minimum reduction at area of fracture, 40 per cent. It shall bend cold 180 degrees to a diameter equal to the thickness of the piece tested, without crack or flaw on the outside of the bent portion.

The work embraced in this contract comprises all that which is to be made of steel in and connected with the tanks, and, in addition thereto, the punching of holes for the wires of the sand layer support, the furnishing of the man-hole covers, gaskets, bridges, bolts, and nuts, the cutting of the man and 20-inch pipe holes, and everything ready for attaching the water pipes, regulators, steps, platforms, and introducing the strainer system.

The rivets shall be of ..... 's best, and of steel, the holes in the plates punched and reamed to fit or match exactly, riveted without the use of drifting, thoroughly caulked and made water-tight.

Rivets shall be cone, button, steeple, or countersunk, as the Water Company may elect.

The tanks shall be built to a height of about three feet, temporarily supported upon blocking at a convenient height above the floor of the house and thoroughly caulked, after which the tanks are to be suspended from the traveling-crane, the blocks removed, a one-inch bed of Portland cement mortar spread upon the floor, the tanks lowered into it, mauled into a level position and evenly bedded in the cement mortar; thereafter, the remainder of the tank is to be built to the form and dimensions given.

The plate-steel of the bottoms, sides, and ends, as well as the ducts of the tanks, shall be made true by planishing them, so as to take out all dents and inequalities in their surfaces, and thereby built suitably to form them into strictly geometrical forms.

The lips of the weirs in the sides of the tanks shall be made square and level throughout by the use of such tools as will accomplish the result. The sides of the easterly and westerly tanks shall

each be reinforced by five 18-inch I-beams, riveted to their sides, resting firmly upon the floor of the house, and abutting and be riveted by means of angles to the bottom of the ducts. Both sides of the middle, the westerly side of the easterly tank and the easterly side of the westerly tank, shall be stayed to each other at intervals corresponding with the 18-inch I-beams placed on the outside of the easterly and westerly tanks.

There shall be riveted to the four corners of each tank, steel horns, 3½ inches in diameter, projecting 7 inches above the top of the tanks, to be used for engaging perforated lugs on the agitator grille, so as to locate correctly and maintain firmly in position the said grille when the agitators are in working position in the tanks, and to firmly retain them in such position while agitating the sand layer.

In the interior and about three feet above the bottom of each tank are to be placed a tier of I-beams, supported on I-beam struts on the floor of the tank and riveted to said sides, to the struts, and

the struts to the bottom of the tank by knees, all as illustrated upon the drawings.

The steel plate and other forms to be used in these tanks shall not be allowed to become rusty before delivery, to effect which purpose it shall be coated with linseed oil before removal from the steel mills.

After the work shall have been completed, the tanks, in all their parts, embracing all their members, shall be thoroughly cleaned, made perfectly dry by the application of a hot air blast, and afterwards receive three coats of asphalt or other paint, as the Water Company may select.

The total weight of steel, cast-iron, and wrought-iron, shall be not less than ..... pounds when completed.

This proposal is submitted for the work, complete, in accordance with the plans and specifications combined. Any minor parts needed for completing the work as intended by drawings and specifications, are herein included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish working drawings, the material, and perform the work bid upon, in conformity with the plans and specifications submitted to us for examination; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence any and all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any of the work awarded to us (except the acts of the Water Company), while said work is in progress and until completed and accepted.

All the foregoing we propose to furnish, do, and complete inside of ..... months from award of contract, for the sum of .....

.....(\$.....)

dollars.

We enclose a certified check in the sum of

.....

(\$.....) dollars, as a guarantee that if the work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret.....will be the.....

.....

which will execute a bond in the sum of.....

.....(\$.....)

dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

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PROPOSAL IV.

FOR 20-INCH, 30-INCH, AND 36-INCH CAST-IRON PIPES, SPECIALS, AND GATE-VALVES CONNECTED WITH THREE FILTER-TANKS.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....
.....as principal ,
and.....
.....as suret....,
being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to furnish the pipes and specials for three filters, transport them to the filter-house, place them in position, and joint them to each other, to the tanks and the gate-valves, all as illustrated upon the drawings, sheets Nos. 9, 10, and 12A, and described in paragraphs 33, 34, 35, 36, 37, 38, 39, 40, and 41, and others if relevant, of the specifications.

We further agree that all these pipes and specials shall be of the best pipe metal, true and sound castings, cast by the most approved methods and coated with coal-pitch varnish, all under the supervision, inspection, test, and to the satisfaction and acceptance of the Louisville Water Company.

The hydrostatic test to which these pipes and specials are to be subjected, at the expense of the contractor, shall be the ordinary one of 300 pounds to the square inch.

We will furnish all the lead, of quality and weight acceptable to the Louisville Water Company, for making the joints, make the joints water-tight, and to the satisfaction and acceptance of said company. Where there are flanged and bolted joints, we will make these joints water-tight and satisfactorily, using canvas-laid rubber gaskets made in one piece for each joint. Where the pipes are united by the ordinary socket and spigot joint packed with lead, we will make the lead packing in the annular space between the spigots and sockets by filling said spaces solidly with lead from the socket faces to a depth of not less than two inches all around, and

use such fibre packing for preventing the molten lead from running inside of the pipes as may afterwards be removed from the sockets inside of the pipes, so as to leave no fibrous material in the pipes which may in time decay, escape from the pipe sockets, and lodge in the strainer system of the filters.

The pipes shall all be supported in the filter-tanks and upon the floor of the filter-house on cast-iron saddles, as illustrated upon the drawings.

After the work shall have been completed, the pipe, specials, and gate-valves shall be thoroughly cleansed, made perfectly dry by the application of a hot-air blast, and afterwards receive a coat of paint, such as the Water Company may select.

The estimated weight of all these pipes, including lead, exclusive of stop-gates, but embracing all 20-inch, 30-inch, and 36-inch pipes, with their connected specials, shall be not less than.....tons of 2,000 pounds each.

This proposal is submitted for the work, complete, in accordance with the plans and specifications combined. Any minor parts needed for completing

it as intended by drawings and specifications are herein included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish working plans, the material, and perform the work bid upon, in conformity with the plans and specifications submitted to us for examination; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we here declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any of the work awarded to us (except the acts of the Water Company), while said work is in progress and until completed and accepted.

All the foregoing we propose to furnish, do, and complete inside of ..... months from award of contract, for the sum of .....

..... ($ .....)

dollars.

We enclose a certified check in the sum of

.....

($ .....) dollars, as a guarantee that if this work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret..... will be the .....

.....

which will execute a bond in the sum of .....

..... ($ .....)

dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL V.

FOR GATE-VALVES.

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....
.....as principal ,
and.....
.....as suret....,
being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to manufacture, transport, and deliver f. o. b. cars at Crescent Hill Reservoir, Louisville, Ky., the following gate-valves:

2 30-inch gate-valves, with socket and spigot ends for ordinary water-pipe connections, weighing each about 6,600 pounds, to be subjected to a test pressure of 300 pounds to the square inch.

2 36-inch gate-valves, with socket and spigot ends for ordinary water-pipe connections, weighing each about 11,000 pounds, to be subjected to a test pressure of 300 pounds to the square inch.

2 48-inch gate-valve, with sockets on each end for ordinary water-pipe connections, weighing about 23,000 pounds, to be subjected to a test pressure of 300 pounds to the square inch.

Also to manufacture, transport, deliver, and connect with the filters and pipes in the filter-house of the Louisville Water Company, the following gate-valves:

24 20-inch flanged gate-valves, weighing each about 2,300 pounds, to be subjected to a test pressure of 200 pounds per square inch.

4 20-inch flanged gate-valves, weighing each about 2,700 pounds, to be subjected to a test pressure of 300 pounds per square inch.

4 36-inch flanged gate-valves, weighing each about 10,000 pounds, to be subjected to a test pressure of 200 pounds per square inch.

These gate-valves shall be constructed in accordance with the specifications in paragraphs 57, 58, 59, 60, 61, 62, 63, 64, and 65, and others if relevant, and placed as illustrated on drawings, sheets Nos. 1A, 9, and 10, under the supervision, inspection, test, and acceptance of the Louisville Water Company.

This proposal is submitted for the work, complete, in accordance with the plans and specifications combined. Any minor parts needed for completing it as intended by drawings and specifications, are herein included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to make working drawings, furnish the material and perform the work bid upon, in conformity with the plans and specifications submitted to us for examination; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we here declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence any and all

work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any of the work awarded to us (except the acts of the Water Company), while said work is in progress, and until completed and accepted.

All the foregoing we propose to furnish, do, and complete inside of.....months from award of contract, for the following sums:

Twenty-four 20-inch flanged gate-valves,.....

.....($.....) dollars.

Four 20-inch flanged gate-valves,.....

.....($.....) dollars.

Four 36-inch flanged gate-valves,.....

.....($.....) dollars.

Two 30-inch gate-valves, with sockets on each end,

.....($.....) dollars.

Two 36-inch gate-valves, with sockets on each end,

.....($.....) dollars.

Two 48-inch gate-valves, with sockets on each end, ...($.....) dollars.

The foregoing to be delivered f. o. b. cars, and connected in place, respectively, as hereinbefore stated.

We enclose a certified check in the sum of..... .....($.....) dollars, as a guarantee that if this work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret..... will be the..... .....

which will execute a bond in the sum of..... .....($.....) dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL VI.

FOR SIX BALANCED 20-INCH PISTON-VALVES.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned..... as principal , and..... as suret....., being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to manufacture, deliver, furnish, erect, and connect to the 20-inch connecting pipes between the ducts and the several unfiltered water supply pipes, six 20-inch balanced piston-valves, as described in paragraph 35, and others if relevant, of the specifications, and illustrated upon drawings, sheets Nos. 9 and 19.

Each valve is to be connected with its center axis, one buoy or float, placed in a suitable vertical extension of the valve case, which buoy or float will so regulate the flow of water through the ports as to maintain the level thereof in the before-named vertical extension of the case, as also in the filter-tank adjacent thereto, at the proper height.

All wearing and bearing parts of the valves, including ports, are to be brass-bushed, and covered with the best acid-proof brass or bronze.

The total weight of the metal of these valves shall be not less than ..... pounds.

This proposal is submitted for the work, complete, in accordance with the plans and specifications combined. Any minor parts needed for completing it as intended by drawings and specifications are herein included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish working drawings, the material, and perform the work bid upon, in conformity with the plans and specifications submitted to us for examination; which plans and speci-

fications we hereby acknowledge to be sufficient, which we understand, and which we here declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any of the work awarded to us (except the acts of the Water Company), while said work is in progress and until completed and accepted.

All the foregoing we propose to manufacture, deliver, and connect, for the sum of.....

.....($.....)

dollars, under the supervision, inspection, test, and acceptance of the Louisville Water Company.

We enclose a certified check in the sum of

.....($.....)

dollars, as a guarantee that if this work is awarded

to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret..... will be the.....

.....

which will execute a bond in the sum of.....

.....(\$.....)

dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL VII.

FOR SIX FLOATING WEIRS.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret....., being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to manufacture, furnish, deliver, erect, and connect to the 20-inchclear water effluent pipes from the filter-tanks, six floating weirs, as described in paragraphs 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, and others if revelant, and illustrated upon drawings, sheets Nos. 9, 10, and 20A.

The total weight of the metal in these weirs shall be not less than.....pounds.

This proposal is submitted for the six floating weirs and appurtenances, erected and completed in

accordance with the plans and specifications combined. Any minor parts needed for completing them as intended by drawings and specifications, are herein included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish working drawings, the material, and perform the work bid upon, in conformity with the plans and specifications submitted to us for examination; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence any and all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any of the work awarded to us (except the

acts of the Water Company), while said work is in progress and until completed and accepted.

All the foregoing we propose to manufacture, deliver, and connect, for the sum of.....

.....($.....) dollars, under the supervision, inspection, test, and acceptance of the Louisville Water Company.

We enclose a certified check in the sum of.....

.....($.....) dollars, as a guarantee that if this work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret.....will be the.....

.....

which will execute a bond in the sum of.....

.....($.....) dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL VIII.

FOR SAND LAYER SUPPORT AND STRAINER SYSTEM.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret....,

being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to furnish the materials, deliver in filter-house, put in place, fasten to tank and to each other, the wire and webs of wire-cloths which are to form the sand layer support and strainer system, all as described in specifications, paragraphs 54, 55, 56, and others if relevant, and illustrated on drawings, sheets Nos. 11A, 12A, and 13B.

This proposal is submitted for furnishing the sand layer support and strainer system in three filter-tanks, erected and completed in accordance with the plans and specifications combined. Any minor parts needed for completing the work as intended by drawings and specifications are herein included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish working drawings, the material, and perform the work bid upon, in conformity with the plans and specifications submitted to us for examination; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we here declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any

of the work awarded to us (except the acts of the Water Company), while said work is in progress and until completed and accepted.

All the foregoing, weighing not less than..... pounds complete, we propose to manufacture, deliver, and connect, for the sum of.....

.....($.....)

dollars, under the supervision, inspection, test, and acceptance of the Louisville Water Company.

We enclose a certified check in the sum of

.....($.....)

dollars, as a guarantee that if this work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret.....will be the.....

.....

which will execute a bond in the sum of.....

.....($.....)

dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL IX.

FOR ELECTRIC TRAVELING-CRANE.

.....

.....

To the Louisville Water Company,

of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret....,

being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to furnish the materials, construct, transport to, deliver in filter-house, erect and put in practical operation, upon ways prepared therefor by the Louisville Water Company, an electric traveling-crane, as described in specifications, paragraphs 19 and 67, and others if relevant, and illustrated by drawings, sheets Nos. 5, 6, 7, 8, and 9.

The crane shall be built to conform to the general plan illustrated upon the drawings, constructed principally of mild steel, ultimate strength 60,000 to 70,000 pounds per square inch; elastic limit, not less than one-half the ultimate strength; elongation, 20 per cent. in eight inches; minimum reduction at area of fracture, 40 per cent. It shall bend cold 180 degrees to a diameter equal to the thickness of the piece tested, without crack or flaw on the outside of the bent portion. The cast iron shall be tough gray metal of the best quality. A cast bar, 5 feet long, 1 inch square, from which the skin has been removed, resting on supports 4 feet 6 inches apart, shall bear, without breaking, a weight of 500 pounds suspended at the center, with a deflection of not less than 1½ inches. The bolts and nuts shall be made of the best quality of rolled coke-made iron, such as used in bridge construction.

The traveling-crane shall be fitted with electric motors, of such design, construction, and power as will satisfactorily operate both the bridge and the trolley, which, together, are to carry a weight, and traverse the floor of the building therewith in both

directions, of not less than 65 tons, exclusive of the weights of trolley and bridge.

The rivet holes shall be drilled or punched and reamed; rivets, of the best.....'s steel rivets, driven carefully and solidly without the use of drifts. Rivets shall be cone, button, steeple, or countersunk, as the Water Company may elect.

The crane shall be placed, completely finished, upon the ways in the filter-house, ready for service. The steel plates, angles, etc., composing the crane shall be delivered and put up free from rust, and thereafter receive a thick coat of raw linseed oil to protect them against rusting until finally painted, which painting is not a part of this contract. The application of the linseed oil may be at the factory before rusting and transportation.

The total weight of steel, cast iron and wrought iron, shall be not less than..... pounds.

This proposal is submitted for the work, complete, in accordance with the plans and specifications combined. Any minor parts needed for completing the work as intended by the drawings and specifications, are herein included and will be furnished,

whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish working drawings, the material, and perform the work bid upon, in conformity with the plans and specifications submitted to us for examination; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we here declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence any and all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and water, by fire and by labor strikes, and all other risks, to any of the work awarded to us (except the acts of the Water Company), while said work is in progress, and until completed and accepted.

All the foregoing we propose to furnish, do, and complete inside of months from award of

contract, for the sum of.....

.....($.....) dollars.

We enclose a certified check in the sum of .....($.....) dollars, as a guarantee that if the work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret.....will be the.....

.....

which will execute a bond in the sum of.....

.....($.....) dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL X.

FOR AGITATOR.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret....,

being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company, to furnish the materials, construct, transport to, deliver in filter-house, suspend, and connect with the trolley upon the electric traveling-crane, an agitator as described in the specifications, paragraphs 18, 66, 68, and 69, and others if relevant thereto, and illustrated by drawings, sheets Nos. 15, 16, 17, and 18.

The agitator shall be built to conform to the general plan illustrated upon the drawings, constructed principally of mild steel, ultimate strength 60,000 to 70,000 pounds per square inch; elastic limit, not less than one-half the ultimate strength; elongation, 20 per cent. in eight inches; minimum reduction at area of fracture, 40 per cent. It shall bend cold 180 degrees to a diameter equal to the thickness of the piece tested, without crack or flaw on the outside of the bent portion. The cast-iron shall be tough gray metal of the best quality. A cast bar, 5 feet long, 1 inch square, from which the skin has been removed, resting on supports 4 feet 6 inches apart, shall bear, without breaking, a weight of 500 pounds suspended at the center, with a deflection of not less than 1½ inches. The bolts and nuts shall be made of the best quality of rolled coke-made iron, such as used in bridge construction.

The agitator shall be fitted with electric motors, worms, worm-wheel nuts, and suspending screws, as illustrated upon the drawings, supported upon, secured to, and connected with, the grille of the agitator, with freely fitted moving parts and abun-

dant strength to perform the functions required thereof.

The rivet holes shall be punched and reamed; rivets, of the best ..... 's steel rivets, driven carefully and solidly without the use of drifts. Rivets shall be cone, button, steeple, or countersunk, as the Water Company may elect.

The agitator shall be placed, completely finished, in the filter-house, suspended from the trucks of the trolley, ready for service. The steel plates, angles, etc., composing the agitator, shall be delivered and put up free from rust, and thereafter receive a thick coat of raw linseed oil to protect them against rusting until finally painted, which painting is not a part of this contract. The application of linseed oil may be made at the factory before transportation.

The total weight of steel, cast-iron, and wrought-iron, shall be not less than ..... pounds.

This proposal is submitted for the work, complete, in accordance with the plans and specifications combined. Any minor parts needed for completing it as intended by drawings and specifica-

tions, are herein included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish working drawings, the material, and perform the work bid upon, in conformity with the plans and specifications submitted to us for examination; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we here declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any of the work awarded to us (except the acts of the Water Company), while said work is in progress and until completed and accepted.

All the foregoing we propose to furnish, do,

and complete inside of.....months from award of contract, for the sum of.....

.....($)

dollars.

We enclose a certified check in the sum of

.....

($.....) dollars, as a guarantee that if the work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret.....will be the.....

.....

which will execute a bond in the sum of.....

.....($.....)

dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL XI.

FOR ELECTRIC MOTORS.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned..... as principal ,

and.....as suret....,

being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to furnish the materials, build, transport, erect, and connect in the filter-house, the electric motors described, embraced, and contemplated by paragraphs 20, 57, 58, 65, and 108, and others if relevant thereto, of the specifications.

The motors shall be of the.....

.....

kind, of a design and construction, including quality of material, acceptable to the Louisville Water Company, for which we submit herewith plans and specifications, in accordance with which the motors are to be constructed, erected, and connected with the leading wires, to the approval, satisfaction, and acceptance of the Water Company. The motors, with all their appliances, have been designed especially for the service to be performed by them, which we guarantee, and agree to keep them in repair for one year after completion and acceptance, so far as repairs may become necessary by reason of the motors failing to perform the work, proving defective in material and construction, or unsuitable for the purpose intended.

This proposal is submitted for furnishing the motors and doing the work complete, in accordance with our plans and specifications combined. Any minor parts needed for completing the work as intended by drawings and specifications, are herein included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish working drawings, the material, and perform the work bid upon, in conformity with the plans and specifications submitted to us for examination; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we here declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any of the work awarded to us (except the acts of the Water Company), while said work is in progress and until completed and accepted.

These motors we propose to furnish in accordance with plans and specifications, inside of..... months from award of contract, for the following prices, viz:

28 one-horse power motors, for operating 20-inch gate-valves inside of filter-house,.....

.....($.....) dollars.

2 two-horse power motors, for operating 30-inch gate-valves outside of filter-house,.....

.....($.....) dollars.

2 three-horse power motors, for operating 36-inch gate-valves outside of filter-house,.....

.....($.....) dollars.

4 three-horse power motors, for operating 36-inch gate-valves inside of filter-house,.....

.....($.....) dollars.

2 four-horse power motors, for operating 48-inch gate-valves outside of filter-house,.....

.....($.....) dollars.

Total,.....

($.....) dollars.

We enclose a certified check in the sum of .....($.....) dollars, as a guarantee that if this work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret..... will be the.....

.....

which will execute a bond in the sum of.....

.....($.....) dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL XII.

FOR GAUGES AND TABLETS.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and .....

.....as suret....,

being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to furnish, deliver, and put up, on acceptable black variegated marble-polished tablets, the gauges described in paragraphs 58, 93, 94, 95, 96, 97, 98, 99, and others if relevant, of the specifications.

We will put them up, including all piping and fittings, upon five different marble tablets, four of them located on the southerly wall in the filter-

house, and one on the northerly wall. Two tablets on the southerly wall shall contain six gauges each; one, three gauges; one, one gauge; and the one on the northerly wall in the house, one gauge; making in all seventeen gauges, upon five different tablets.

We submit herewith designs and descriptions, with specifications of the several gauges to be furnished, as follows:

This proposal is submitted for furnishing the gauges and tablets, complete, in accordance with illustrations, descriptions, and specifications combined. Any minor parts needed for completing them, as intended by illustrations, descriptions, and specifications, are herein included, and will be furnished, whether or not they are illustrated upon our plans or enumerated in our descriptions and specifications.

We further agree to furnish the gauges, marble tablets, and erect them completed in accordance with the illustrations, descriptions, and specifications we have submitted for examination, which illustrations, descriptions, and specifications we hereby present as sufficient, which we understand, and which we hereby declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence any and all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time spec-

ified for this class of work, and assume as independent contractors all risks of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and labor strikes, and all other risks to this work awarded to us (except the acts of the Water Company), while said gauges and tablets are in progress of manufacture, transportation, erection, and until completed and accepted.

These gauges and tablets we propose to furnish in accordance with our illustrations, descriptions, and specifications, inside of..... months from award of contract, for the following prices, viz:

Six pressure gauges, as described in paragraph 94 of the specifications, upon one marble tablet, for the sum of.....

($.....) dollars.

Six vacuum gauges, as described in paragraph 95 of the specifications, with marble tablet, for the sum of.....

($.....) dollars.

Two vacuum gauges and one pressure gauge, as described in paragraphs 96 and 97, respectively, of

the specifications, placed upon one marble tablet, for the sum of.....

($.....) dollars.

Two pressure gauges, as described in paragraph 98 of the specifications, erected each upon a tablet, one in the southerly and the other in the northerly end of the filter-house, for the sum of.....

.....($.....) dollars.

We enclose certified check in the sum of.....

.....($.....) dollars, as a guarantee that if the work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret..... will be the.....

.....

which will execute a bond in the sum of.....

.....($.....) dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL XIII.

FOR SAND.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret....,

being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to furnish, deliver, and put in each of the three tanks in the southerly end of the filter-house, five hundred (500) cubic yards of sand, as described in specifications, paragraph 91, and others if relevant.

This proposal is submitted conditioned upon furnishing sand of acceptable quality in all respects. We submit herewith samples which exhibit the degree of fineness, uniformity in size of grain, and cleanness of the sand which we propose to furnish.

We will furnish this sand, transport it to the filter-house, and deposit it in the tanks of the filters, for the sum of.....

($.....) dollars per cubic yard, measured in the tanks, and will deliver same whenever the Louisville Water Company will be ready to receive it.

We enclose a certified check in the sum of ..... ($.....) dollars, as a guarantee that if the work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret..... will be the.....

.....

which will execute a bond in the sum of.....

.....($.....) dollars, guaranteeing our performance of this work in accordance with the samples, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL XIV.

FOR STAND-PIPE AND FOUR SULPHATE OF ALUMINA SOLUTION TANKS.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret....,

being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to furnish the materials and perform the work embraced and contemplated by paragraphs 7, 72, 80, 81, 82, 83, and 85, and others if relevant, of the specifications, and illustrated on drawings, sheets Nos. 23, 24, etc.

The stand-pipe shall be built to the form and dimensions, thickness of metal, and size of members

all as illustrated upon the drawings. It shall be built of mild steel, ultimate strength 60,000 to 70,000 pounds per square inch; elastic limit, not less than one-half the ultimate strength; elongation, 20 per cent. in eight inches; minimum reduction at area of fracture, 40 per cent. It shall bend cold 180 degrees to a diameter equal to the thickness of the piece tested, without crack or flaw on the outside of the bent portion.

The rivets shall be of.....'s best, and of steel, the holes in the plates are to be drilled or punched and reamed to fit or match exactly, riveted without the use of drifting, thoroughly caulked and made water-tight. Rivets shall be cone, button, steeple, or countersunk, as the Water Company may elect.

The stand-pipe shall be built in two sections, the lower 45 feet and the upper 30 feet, in height, all as illustrated upon the drawings and described in the specifications.

The erection of the pipe shall be commenced by putting together on falseworks the bottom thereof, the angle-bar around the lower circumference con-

necting bottom and side, and the lower course of ¾-inch steel-plate side, with the joints thoroughly caulked, in which condition it is to be stayed to preserve its form, supported on jacks outside of it, have a one-inch bed of Portland mortar spread thereunder, then be lowered into it solidly bedded by wooden mauls to a uniformly solid and level position, after which the remainder of the side is to be erected.

We further agree to furnish, deliver, put in place and rivet to the sides of the stand-pipe, the two 48-inch nozzles, described in paragraph 83 of the specifications, and illustrated on the drawings, sheets Nos. 23, 24, etc.

The steel-plate and other forms to be used in the construction of this stand-pipe shall not be allowed to become rusty before delivery, to effect which purpose it shall be coated with linseed oil before removal from the steel mills. After the work shall have been completed, the stand-pipe, in all its parts, shall be thoroughly cleaned, made perfectly dry, and afterwards receive three coats of such asphalt or other paint as the Water Com-

pany may select, except the inside surfaces of the 45-foot section of the pipe, which are to be coated with Portland cement mortar all around one inch thick.

The total weight of steel, cast-iron, and wrought-iron shall be not less than.....pounds when the stand-pipe is completed.

This proposal is submitted for the work, complete, in accordance with the plans and specifications combined. Any minor parts needed for completing it as intended by drawings and specifications are herein included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish working drawings, the material, and perform the work bid upon, in conformity with the plans and specifications submitted to us for examination; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence any and all work pertaining

thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any of the work awarded to us (except the acts of the Water Company), while said work is in progress and until completed and accepted.

We also propose to furnish and complete inside of..... months from award of contract, the several parts of the stand-pipe, for the following sums, viz:

For the stand-pipe, complete, 75 feet high, including material and painting, the sum of.....

.....($.....) dollars.

For two 48-inch cast-iron nozzles, with flanges and sockets, furnished, put in place, and riveted to stand-pipe, the sum of.....

.....($.....) dollars.

For coating the stand-pipe on the inside, both bottom and side, with Portland cement mortar one

inch thick, the sum of.....

.....($.....) dollars.

We enclose a certified check in the sum of.....

.....($.....) dollars, as a guarantee that if this work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret..... will be the.....

.....

which will execute a bond in the sum of.....

.....($.....) dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL XV.

FOR METER-MOTOR.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret....,

being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to design, construct, test, furnish, transport to, and erect in the stand-pipe within the coagulant-house, a meter-motor, as described in paragraphs 75, 84, and 86, and others if relevant, of the specifications, and represented upon drawings, sheets Nos.

.....

We propose to design, construct, and calibrate

this meter-motor so as to pass water at a known percentage of the volume due to the displacement by the rotation of the buckets, which percentage we propose to determine experimentally between ranges of delivery rates, commencing with 10 million gallons per 24 hours and ending with 75 million gallons, and a speed varying from ten to twenty revolutions per minute.

We propose to so design and construct this meter-motor as to yield not less than six-horse power mechanical energy at the lowest rate of speed for which the coefficient of water delivery by the meter-motor has been determined. We propose to build the meter-motor of either acid-proof bronze or aluminum, of such design, precision of fluid volume measurement, and smoothness of action as to give it the greatest practicable durability.

This proposal is submitted for building, testing, and calibrating the meter-motor in accordance with our drawings, descriptions, and specifications, as also to meet the requirements of the Water Company's specifications and drawings. Any minor parts needed for completing it as intended by illustrations, de-

scriptions, and specifications, are hereby included and will be furnished, whether or not they are illustrated upon our plans or enumerated in our descriptions and specifications.

We further agree to transport, deliver, and erect in the stand-pipe, the meter-motor in accordance with the illustrations, descriptions, and specifications we have submitted for examination; which illustrations, descriptions, and specifications we hereby present as sufficient, which we understand, and which we hereby declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence any and all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to this work awarded to us (except the acts of the Water Company), while said meter-motor is in progress of design, manufacture, calibration, transportation, erection, and until completed and accepted.

We will construct, transport, erect, and complete meter-motor in accordance with our illustrations,

descriptions, and specifications, and the Water Company's specifications, in which the vertical height of the meter-motor is to end with a flange at a point 40 feet from the bottom of the stand-pipe, inside of.....months from award of contract, for the sum of.....

($.....) dollars, if made of acid-proof bronze; or

.....($.....)

dollars if made of aluminum.

We enclose a certified check in the sum of

.....

($.....) dollars, as a guarantee that if this work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret.....will be the.....

.....

which will execute a bond in the sum of.....

.....($.....)

dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL XVI.

FOR PUMPS AND SLOTTED DISC-CRANK.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret....,

being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to design, construct, test, furnish, transport to, and erect in, the stand-pipe within the coagulant-house, a brass or aluminum pump and slotted disc-crank, as described in paragraphs 76, 86, 87, 88, 89, 106, and others if relevant, of the specifications, and represented on drawings, sheets Nos. .

We propose to design and construct the slotted disc-crank so as to be bolted to the upper end of

the meter-motor shaft in the stand-pipe, and connect therewith, through a connecting-rod as described in the specifications, the pump described in paragraph 106 of said specifications. The pump and slotted disc are to be supported upon and guided in two floors, one near the top, and the other at the top, of the stand-pipe, as illustrated upon the drawings.

We propose to construct the slotted disc-crank with a sliding block and crank-pin, to be adjusted by the use of a hand-ratchet operated micrometer screw, so as to vary the length of the stroke while the meter-motor and pump are in motion.

We propose further to construct this pump with valves and packing so perfectly constructed and adjusted as to cause the pump to deliver 98 per cent. of the volume due to the area of the plunger into the length of the stroke.

This proposal is submitted for building and erecting, complete, the pump and slotted disc-crank mechanisms, including revolution counter and gallons register, in accordance with our drawings, descriptions, and specifications, as also to meet the requirements of the Water Company's specifications and

drawings. Any minor parts needed for completing the work as intended by drawings, descriptions, and specifications are herein included and will be furnished, whether or not they are illustrated upon the plans or enumerated in our descriptions and specifications.

We further agree to transport, deliver, and erect in the stand-pipe, the pump and slotted disc-crank in accordance with the illustrations, descriptions, and specifications we have submitted for examination; which illustrations, descriptions, and specifications we hereby present as sufficient, which we understand, and which we hereby declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence any and all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to this work awarded to

us (except the acts of the Water Company), while said pump and slotted disc-crank are in progress of design, manufacture, transportation, erection, and until completed and accepted.

We will construct, transport, and erect, complete, in the coagulating-house, at the top of the stand-pipe, one slotted disc-crank connected with two pumps, including revolution counter and gallons register, in accordance with our illustrations, descriptions, and specifications, as also the Water Company's plans and specifications, inside of..... months from award of contract, for the sum of.....

.....($.....)

dollars, if two acid-proof pumps are adopted; or

.....($.....)

dollars, if the pumps are constructed of aluminum; in either case, one pump being erected and put in operation, while the other is furnished as a reserve, ready to take the place of the one connected.

We enclose a certified check in the sum of

.....($.....)

dollars, as a guarantee that if this work is awarded to us we will execute a contract therefor, with ap-

proved security, within ten days from the time of awarding the contract.

Our suret..... will be the.....

.....

which will execute a bond in the sum of.....

.....($.....)

dollars, guaranteeing our performance of this work in accordance with the illustrations, descriptions, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL XVII.

FOR FLOATING DISCHARGE TUBE IN STAND-PIPE.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....
.....as principal ,
and .....
.....as suret....,
being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to design, construct, transport to, and erect in the stand-pipe within the coagulant-house, and erect and connect in the stand-pipe thereof, one floating discharge tube as described in specifications, paragraphs 77 and 85, and others if relevant, and illustrated by drawings, sheets Nos.

The floating-tube shall be constructed of acid-

proof bronze or aluminum, with a buoy or float attached so as to cause the weir lip of the inflow end of it to be submerged below the surface of the water, the depth of submergence to be controlled by the weighting of it to a greater or less degree, so as to float it at any desirable depth of submergence. The weir tube is to be 48 inches in diameter in the clear, and is to pass through metallic water-packed guide rings in the upper end of a 72-inch internal diameter effluent tee pipe, with a 48-inch delivery branch bolted to the effluent nozzle of the standpipe described in paragraph 85. On the outside the tube is to be truly cylindrical and smoothly finished so as to pass practically frictionless through the metallic water-packed guide-rings before named. The 72-inch x 72-inch x 48-inch cylinder and standing tee pipe is to be of cast-iron, as illustrated upon the drawings; and is to be coated with coal-tar pitch, applied in a hot bath, in the most approved manner and to the satisfaction and acceptance of the Water Company.

This proposal is submitted for furnishing, building, and erecting, complete, the floating-tube, in ac-

cordance with our drawings, descriptions, and specifications, as also to meet the requirements of the Water Company's specifications and drawings. Any minor parts needed for completing the work as intended by drawings, descriptions, and specifications, are hereby included and will be furnished, whether or not they are illustrated upon the plans or enumerated in our or the Water Company's descriptions and specifications.

We further agree to construct, transport, deliver, and erect in the stand-pipe, the floating-tube in accordance with illustrations, descriptions, and specifications we have submitted for examination, as also those submitted by the Water Company, all which we hereby present and declare as sufficient, which we understand, and which we hereby declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence any and all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified therefor, and assume as independent contractors all risk of accidents and claims for damages. We

will also run the risk of damage by transportation, by climatic causes, or wind and water, by fire and by labor strikes, and all other risks to this work awarded to us (except the acts of the Water Company), while said floating-tube is in progress of design, manufacture, transportation, and erection, and until completed and accepted.

We will design, construct, transport, and erect, complete, in accordance with our illustrations, descriptions, and specifications, as also those of the Water Company, inside of..... months from award of contract:

Three pieces 72-inch x 72-inch x 48-inch standing cylinder cast-iron tee and pipe, for the sum of .....($.....) dollars.

The floating-tube, with weir and buoy attached, for the sum of.....

($.....) dollars if made of acid-proof bronze; or the sum of.....

($.....) if made of aluminum.

We enclose a certified check in the sum of .....($.....)

dollars, as a guarantee that if the work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret..... will be the.....

.....

which will execute a bond in the sum of.....

.....($.....) dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL XVIII.

FOR ONE SULPHATE OF ALUMINA REGULATING AND FEED-TANK.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret....., being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to furnish the materials and perform the work embraced and contemplated by paragraphs 74 and 103, and others if relevant, of the specifications, and illustrated on drawings, sheets Nos. .

The tank shall be built to the form and dimensions, thickness of metal, and size of members, all as illustrated upon the drawings. It shall be built of mild steel, ultimate strength 60,000 to 70,000

pounds per square inch; elastic limit, not less than one-half the ultimate strength; elongation, 20 per cent. in eight inches; minimum reduction at area of fracture, 40 per cent. It shall bend cold 180 degrees to a diameter equal to the thickness of the piece tested, without crack or flaw on the outside of the bent portion.

The rivets shall be of..... 's best, and of steel, the holes in the plates are to be drilled or punched and reamed to fit or match exactly, riveted without the use of drifting, thoroughly caulked and made water-tight.

The tank shall be erected upon and fastened to I-beams built into the house wall at one end, and fastened to the outside of the stand-pipe or coagulating-tank on the other end, and connected by wrought-iron lead-lined pipes, seven or eight inches in diameter, with the sulphate of alumina solution-tanks as described in paragraph , and with wrought-iron lead-lined screw-jointed pipes, seven or eight inches in diameter, to the sulphate of alumina solution regulating and feed pump, as described in paragraph .

The tank is to be fitted with a float-valve connected with the inflow pipe from the sulphate of alumina solution tanks, so as to maintain the level of the solution in the 10-foot tank at one constant level.

The steel-plate and other forms to be used in the construction of this tank shall not be allowed to become rusty before delivery, to effect which purpose it shall be coated with linseed oil before removal from the steel mills. After the work shall have been completed, the stand-pipe, in all its parts, shall be thoroughly cleaned, made perfectly dry, and afterwards receive three coats of such asphalt or other paint as the Water Company may select, except the inside surfaces of the tank, which are to be coated with Portland cement mortar all around one inch thick.

The total weight of steel, cast iron and wrought iron, shall be not less than..... pounds when the tank is completed.

This proposal is submitted for the work, complete, in accordance with the plans and specifications combined. Any minor parts needed for completing

it as intended by drawings and specifications, are herein included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish working drawings, the material, and perform the work bid upon, in conformity with the plans and specifications submitted to us for examination; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we hereby declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence any and all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any of the work awarded to us (except the acts of the Water Company), while said work is in progress and until completed and accepted.

We also propose to furnish and complete, inside of ..... months from award of contract, the tank with all its connections, completely erected, for the following sums, namely:

For the tank, complete, including all material and painting, and seven-inch wrought-iron lead-lined pipe with bronze fittings, the sum of .....

..... ($.....)

dollars. Or the same with eight-inch wrought-iron lead-lined pipe and bronze fittings, the sum of

..... ($.....)

dollars.

For coating the inside of the tank, both bottom and sides, with Portland cement mortar one-inch thick, the sum of .....

..... ($.....)

dollars.

We enclose a certified check in the sum of

.....

($.....) dollars, as a guarantee that if the work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret..... will be the.....

.....,

which will execute a bond in the sum of.....

.....($.....)

dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL XIX.

FOR PIPES, SPECIALS, FITTINGS, AND VALVES IN COAGULANT-HOUSE.

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret....,

being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to design, construct, test, furnish, transport to, and erect in the coagulant-house, as described in paragraphs 104, 105, and others if relevant, of the specifications, and represented upon drawings, sheets Nos. and , the following:

1. The 7-inch or 8-inch wrought-iron screw-jointed lead-lined pipes, with fittings and valves, required for the main floor water supply pipe from

the sidewalk on Frankfort Avenue to the four sulphate of alumina solution tanks.

2. The 7-inch or 8-inch wrought-iron screw-jointed lead-lined pipes, with fittings and valves, discharging the sulphate of alumina solution from the preparation tanks into the regulating and feed-tank.

3. The 7-inch or 8-inch wrought-iron screw-jointed lead-lined pipes, with fitting and valves, connecting the sulphate of alumina solution regulating and feed-pump with the regulating and feed-tank, and the discharge pipe for injecting the sulphate of alumina solution into the stream of subsided inflowing water.

4. The 7-inch or 8-inch wrought-iron screw-jointed lead-lined pipes, with fittings and valves, conducting the sulphate of alumina solution from the pump into the stream of inflowing settled water.

5. The 6-inch wrought-iron screw-jointed drain pipes, with valves and fittings, from the several floors of the coagulant-house into the sewer.

6. Six sinks on brackets, with roll rim back, with center outlet, white enameled inside and bronzed outside, 20 inches by 40 inches in size, back 15

inches high, fitted with two nickel-plated ¾-inch Fuller compression faucets, 1½-inch drain pipes, all put up and connected with main drain pipe.

We propose further to design and construct all these after the most approved methods, under the supervision and to the satisfaction and acceptance of the Louisville Water Company.

This proposal is submitted for the work, complete, in accordance with the plans and specifications combined. Any minor parts needed for completing the work as intended by drawings and specifications are herein included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish working drawings, the material, and perform the work bid upon, in conformity with the plans and specifications submitted to us for examination; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we hereby declare binding upon us as a contract for this portion of the work, if it is awarded to us. And further, that we will forthwith commence any and all work per-

taining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any of the work awarded to us (except the acts of the Water Company), while said work is in progress and until completed and accepted.

All the foregoing we propose to furnish, construct, and complete inside of.....months from award of contract, for the following prices:

1. For the 7-inch wrought-iron, screw-jointed, lead-lined pipes, with fittings and valves, as hereinbefore named, the sum of.....

.....($.....) dollars;

or, for the 8-inch, the sum of.....

.....($.....) dollars.

2. For the 7-inch wrought-iron, screw-jointed, lead-lined pipes, with fittings and valves, as hereinbefore named, the sum of.....

.....($.....) dollars;

or, for the 8-inch, the sum of.....

.....($.....) dollars.

3. For the 7-inch wrought-iron, screw-jointed, lead-lined pipes, with fittings and valves, as hereinbefore named, the sum of.....

.....($.....) dollars;

or, for the 8-inch, the sum of.....

.....($.....) dollars.

4. For the 7-inch wrought-iron, screw-jointed, lead-lined pipes, with fittings and valves, as hereinbefore named, the sum of.....

.....($.....) dollars;

or, for the 8-inch, the sum of.....

.....($.....) dollars.

5. The 6-inch wrought-iron, screw-jointed drain-pipes, with fittings and valves, as hereinbefore named, the sum of.....

.....($.....) dollars

6. For the six sinks, faucets, and drain-pipes, as hereinbefore named, the sum of.....

.....($.....) dollars.

We enclose a certified check in the sum of

.....

($.....) dollars, as a guarantee that if this work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret..... will be the .....

.....

which will execute a bond in the sum of.....

..... ($.....)

dollars, guaranteeing our performance of this work in accordance with the illustrations, descriptions, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

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PROPOSAL XX.

FOR GALLERIES, PLATFORMS, FLOORS, AND STAIRS.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret....., being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to furnish the materials, construct, transport, and erect in the filter and coagulant-houses, the galleries, platforms, floors, stairways, and railings described in paragraphs 53 and 80, and others if relevant, of the specifications, and illustrated upon drawings, sheet No. 14.

We further agree that, in the construction and

erection of these appurtenances to the filter and coagulant-houses, we will use the most suitable and best metals of the several kinds, and construct after the most approved methods, transport to, and erect the same in said filter and coagulant-houses under the supervision and to the satisfaction and acceptance of the Louisville Water Company.

This proposal is submitted for the work complete, in accordance with plans and specifications combined. Any minor parts needed for completing the work as intended by drawings and specifications are herein included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish working drawings, the material, and perform the work bid upon, in conformity with the plans and specifications submitted to us for examination; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we hereby declare binding upon us as a contract for this portion of the work, if it is awarded to us. And further, that we will forthwith commence any and all work per-

taining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any of the work awarded to us (except the acts of the Water Company), while said work is in progress, and until completed and accepted.

All the foregoing we propose to furnish, construct, and complete inside of..... months from award of contract, for the following prices:

For the galleries, stairs, railings, and appurtenances at the northerly and southerly ends of the southerly group of three filters in the filter-house, the steel, wrought and cast-iron therein weighing not less than.....pounds, the sum of.....

.....($.....) dollars.

For one steel, wrought and cast-iron stairway, on the outside of the northwesterly corner of the filter-house, from the sidewalk on Frankfort Avenue to the level of the filter-house floor, terminating at a

door near the north end of said house, the steel, wrought and cast-iron weighing not less than .....pounds, the sum of.....

.....($.....) dollars.

For one steel, wrought and cast-iron stairway from the sidewalk level on Frankfort Avenue, inside of and down along the northerly wall of the coagulant-house to the level of the filter-house floor, and thence to the lower floor of the coagulant-house, the steel, wrought and cast-iron thereof weighing not less than.....pounds, the sum of.....

.....($.....)

For one steel, wrought and cast-iron spiral stairway, 6½ feet extreme diameter and.....feet in height, to be erected in the northwesterly corner of the coagulant-house, from the lower to the top floor thereof, the steel, wrought and cast-iron thereof weighing not less than.....pounds, the sum of.....

($.....) dollars.

For the four floors in the coagulant-house, the steel, wrought and cast-iron thereof weighing not

less than.....pounds, the sum of.....

.....($.....) dollars.

We enclose certified check in the sum of.....

.....($.....) dollars,

as a guarantee that if the work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret..... will be the.....

.....

which will execute a bond in the sum of.....

.....($.....)

dollars, guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

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PROPOSAL XXI.

FOR ELEVATOR IN COAGULANT-HOUSE.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret.....,

being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to furnish the materials, construct, transport, and erect in the coagulant-house, the elevator described in paragraphs 80 and 107, and others if relevant, of the specifications, and illustrated upon the drawings, sheets Nos.

We further propose to furnish design, drawings, and specifications, to conform to the Water Com-

pany's drawings and specifications, for the elevator completely erected under the supervision and to the approval and acceptance of the Louisville Water Company.

This proposal is submitted for the work, complete, in accordance with the Water Company's and our plans and specifications combined. Any minor parts needed for completing it as intended by all the drawings and specifications are herein included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish working drawings, the material, and perform the work bid upon, in conformity with the plans and specifications of the Water Company and ourselves jointly submitted for the purpose; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we hereby declare binding upon us as a contract for this portion of the work, if it be awarded to us. And further, that we will forthwith commence any and all work pertaining thereto, and continuously prosecute it until com-

pleted, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any of the work awarded to us (except the acts of the Water Company), while said work is in progress and until completed and accepted.

Accordingly, we propose to furnish, construct, and complete the elevator in ..... months from award of contract, for the sum of .....

..... ($.....) dollars.

We enclose a certified check in the sum of ..... ($.....) dollars, as a guarantee that if the work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret..... will be the .....

.....

which will execute a bond in the sum of .....

..... ($.....)

dollars, guaranteeing our performance of this work in accordance with the Water Company's and our plans and specifications combined, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL XXII.

FOR TWO CHRONOMETERS.

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned..... as principal , and..... as suret....., being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to furnish the materials, construct, transport, put up, adjust, and regulate in each of the coagulant and filter-houses, a chronometer or standard clock as described in specifications, paragraph 100.

We further propose to furnish illustrations, designs, drawings, and specifications of what we propose to furnish, which shall conform to the Water Company's specifications for the chronometers which we propose to furnish.

This proposal is submitted for the work, complete, in accordance with the Water Company's specifications and our illustrations, designs, drawings, and specifications combined. Any minor parts needed for completing it as intended by all the drawings and specifications are herein included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish the material and perform the work bid upon, in conformity with the plans and specifications of the Water Company and ourselves jointly submitted for the purpose; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we hereby declare binding upon us as a contract for this portion of the work, if it is awarded to us. And further, that we will forthwith commence any and all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risk of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind

and weather, by fire and by labor strikes, and all other risks to any of the work awarded to us (except the acts of the Water Company), while said work is in progress, and until completed and accepted.

Accordingly, we propose to furnish, construct, and complete the chronometers in.....months from award of contract, for the sum of.....

.....

($.....) dollars.

We enclose a certified check in the sum of.....

.....($.....) dollars, as a guarantee that if this work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret.....will be the.....

.....

which will execute a bond in the sum of.....

.....($.....) guaranteeing our performance of this work in accordance with the plans, specifications, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL XXIII.

FOR LIGHTING FILTER AND COAGULANT-HOUSES.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret....,

being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to furnish the material, wires, lamps, and everything pertaining thereto, for lighting the filter and coagulant-houses, as described in specifications, paragraph 112.

We further propose that our plan of lighting shall embrace the following details:

.....

.....

We also propose to furnish herewith drawings and specifications, illustrative and descriptive of the plan of lighting described in the preceding paragraph, for the approval and acceptance of the Louisville Water Company.

This proposal is submitted for the work, complete, in accordance with our and the Water Com-

pany's plans and specifications combined. Any minor parts needed for completing it as intended by our plans and specifications, are hereby included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish working drawings, the material, and perform the work bid upon, in conformity with our plans and specifications, and to the approval and acceptance of the Louisville Water Company; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we hereby declare binding upon us as a contract for this portion of the work, if it is awarded to us. And further, that we will forthwith commence any and all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified for this class of work, and assume as independent contractors all risks of accidents and claims for damages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any of the work

awarded to us (except the acts of the Water Company), while said work is in progress and until completed and accepted.

Accordingly, we propose to furnish, construct, and complete the lighting in ..... months from award of contract, for the sum of .....

..... ($.....) dollars.

We enclose a certified check in the sum of ..... ($.....) dollars, as a guarantee that if the work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret..... will be the .....

.....

which will execute a bond in the sum of .....

..... ($.....) dollars, guaranteeing our performance of this work in accordance with the Water Company's and our plans and specifications combined, terms of contract, and the sum agreed upon.

Very respectfully,

.....

.....

PROPOSAL XXIV.

FOR HEATING SYSTEM.

.....

.....

To the Louisville Water Company,
of Louisville, Ky.

GENTLEMEN:

We, the undersigned.....

.....as principal ,

and.....

.....as suret....,

being all the parties directly or indirectly interested in this bid, propose to the Louisville Water Company to furnish the materials and erect in the filter and coagulant-houses at Crescent Hill, two systems of heating, as contemplated by paragraphs 110 and 111, and others if relevant, of the specifications.

We further propose that our plan of heating shall embrace the following details:

.....

.....

We also propose to furnish herewith drawings and specifications, illustrative and descriptive of the systems of heating described in the preceding para-

graph, for the approval and acceptance of the Louisville Water Company.

This proposal is submitted for the work, complete, in accordance with our and the Water Company's specifications, and our plans combined. Any minor parts needed for completing it as intended by our plans and both the said specifications, are herein included and will be furnished, whether or not they are illustrated upon the drawings or enumerated in the specifications.

We further agree to furnish the material and perform the work bid upon, in conformity with our plans and specifications, and to the approval and acceptance of the Louisville Water Company; which plans and specifications we hereby acknowledge to be sufficient, which we understand, and which we hereby declare binding upon us as a contract for this portion of the work, if it is awarded to us. And further, that we will forthwith commence any and all work pertaining thereto, and continuously prosecute it until completed, which shall be in the time specified therefor, and assume as independent contractors all risk of accidents and claims for dam-

ages. We will also run the risk of damage by transportation, by climatic causes, or wind and weather, by fire and by labor strikes, and all other risks to any of the work awarded to us (except the acts of the Water Company), while said work is in progress and until completed and accepted.

Accordingly, we propose to furnish, construct, and complete the heating system in.....months from award of contract, for the following prices:

1st. For a system of steam-heating in the filter-house, the sum of.....

.....($.....)

dollars

2nd. For a system of steam-heating in the coagulant-house, the sum of.....

.....($.....)

dollars.

3rd. For a system of electric heating in the filter-house, the sum of.....

.....($.....)

dollars.

4th. For a system of electric heating in the coagulant-house, the sum of.....

.....($.....)

dollars.

We enclose a certified check in the sum of .....($.....)

dollars, as a guarantee that if this work is awarded to us we will execute a contract therefor, with approved security, within ten days from the time of awarding the contract.

Our suret..... will be the.....

.....

which will execute a bond in the sum of.....

.....($.....)

dollars, guaranteeing our performance of this work in accordance with the Water Company's and our specifications and our plans combined, the terms of contract, and the sums agreed upon.

Very respectfully,

.....

.....

DRAWINGS.

The following list comprises the drawings which have been prepared for the purpose of illustrating the construction of the filters proposed, and to enable bidders to make estimates of cost:

A. B. C. General plans and details of clear-water reservoir and filter-house, referred to in the specifications, which illustrate work contracted for and now in process of construction, at the completion of which the erection of the filters is to be commenced.

1 A. General ground plan of the easterly compartment of clear-water reservoir and the pipe lines in Frankfort and Long avenues adjacent thereto.

2. Openings in filter-house floor at north and south ends.

3. Openings in filter-house floor at center.

4. Cast-iron liners for openings in filter-house floor.

5. General plan of electric traveling-crane for handling the grille with agitators.

6. Details of travelers, girders, etc.

7. Details of travelers, girders, etc.

8. Tracks, racks, spur-gear, etc., for longitudinal traveler.

9. General plan of filter-tanks and longitudinal section of filter-house.

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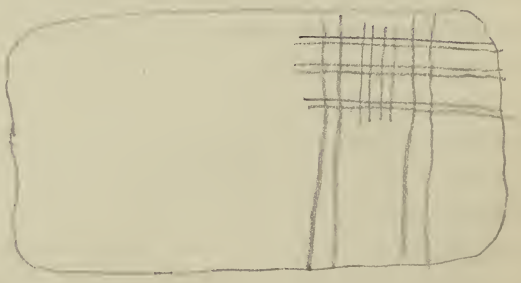

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